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MEDICINA NAUTICA.

VOL. II.

Medicina Nautica:

AN

ESSAY

ON

THE DISEASES OF SEAMEN:

WITH

AN APPENDIX,

CONTAINING

COMMUNICATIONS ON THE NEW DOCTRINE
OF CONTAGION AND YELLOW FEVER,
BY AMERICAN PHYSICIANS;

TRANSMITTED TO THE ADMIRALTY BY SIR JOHN TEMPLE,
BART, HIS MAJESTY'S CONSUL-GENERAL.

VOL. II.

BY THOMAS TROTTER, M.D.
MEMBER OF THE ROYAL MEDICAL SOCIETY,
HONORARY MEMBER OF THE ROYAL PHYSICAL AND OTHER LITERARY
SOCIETIES OF EDINBURGH,
AND PHYSICIAN TO HIS MAJESTY'S FLEET.

QUALIS AB INCEPTO.

LONDON:
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1799.

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TO

GEORGE JOHN EARL SPENCER, K. G.

FIRST LORD OF THE ADMIRALTY, &c.

MY LORD,

I BEG leave, with due ſubmiſſion, to recommend this Volume of MEDICINA NAUTICA to your Lordſhip's protection.

While, by a wiſe diſtribution of the naval force of GREAT BRITAIN, and by prompt and efficacious meaſures, You have enabled her Fleets to achieve victories, and perform prodigies of valour unrivalled in the hiſtory of nations, the independence of Europe has been ſuſtained, and a proſpect opened for the reſtoration of tranquillity to the civilized world.

The health of men who have thus wrought the deliverance of Society, cannot be a ſecondary conſideration with an Engliſh Stateſman. But the ſubject is of that nature, that it muſt engage unremitted attention, leſt its practical duties ſhould relax into mere forms of office. The acquirements of Science may dazzle, and the attendance of the Medical Profeſſion may amuſe mankind; but if Diſeaſe fail to intereſt the heart and the benevolent affections, they become inſulters of human affliction, and "*mock defrauders of the tomb.*" The Vote of Seamen for the ſervice of the current year has been one hundred and twenty thouſand. Of this number many muſt die from the common maladies of life; many from the fate of battle; but more from the ſevere viciſſitudes of climate and ſeaſon, and the unavoidable hardſhips incident to their employment. Unreſtrained by order, and regardleſs of puniſhment, they are heedleſs, turbulent, ferocious, and revengeful: but controlled by diſcipline, under the authority and addreſs of intelligent Officers, they are generous, patient, courageous, and invincible. Their moſt fatal Diſeaſes are peculiar to themſelves; from habit they are regardleſs of health, and muſt therefore, of neceſſity, be watched like children, as little can be expected from their own diſcretion. Theſe ſingularities of character offer the greater ſcope for the exerciſe of every tender feeling, in the Miniſter, the Officer, and Medical Attendant, as it muſt be deemed the more noble, diſintereſted, and ſincere, when beſtowed on men who cannot appreciate the motive. How conſoling then muſt it be to *thoſe* dignified Commanders who have patronized ſo many improvements, whoſe countenance has cheered our labours, and whoſe good wiſhes ſtill keep pace with theſe exertions!

In the high office which Your Lordſhip has filled with diſtinguiſhed ability, to the advantage of this Country and the intereſts of Europe, the ſplendor of ſtation, and the power of patronage, may have their due value. But to a Chriſtian Stateſman, and an enlightened mind, it affords richer gratifications. Your naval adminiſtration has been renowned by a ſeries of victories; and the ſatisfaction which you have felt, in announcing them to the Nation, could only be equalled by condeſcending, with a Board of Admiralty, to viſit the Hoſpital-Ship of the Fleet, and every Ward in Haſlar Hoſpital, for the purpoſe of extending the comforts of the Sick. In the one caſe You performed the duties of office; but the example of the other was from a higher model.

As the confidence of the SOVEREIGN, and the ſuffrage of the Country, will probably long retain you at the head of the ADMIRALTY, we gladly hope the improvements in this Department will be progreſſive; and to this You will be encouraged by the advancement which Medical Science is making under your auſpices. I truſt that the preſent Volume will give a favorable idea of the abilities and exertions of Naval Surgeons; and that the means taken for promoting inquiry have not altogether failed. It contains matter important from its practical nature, and which has prematurely drawn it before the public eye. The ſubject of Contagion is reſumed; and our opinions are now ſupported by doctrines taught in another Hemiſphere; in which a bold and maſterly induction of Chemical Philoſophy has given birth to very new ideas, and expelled from untenable ground an hoſt of ancient prejudices.

I have the honour to be,

MY LORD,

Your Lordſhip's

Faithful humble Servant,

T. TROTTER.

SPITHEAD,
December 30, 1798.

CONTENTS.

PAGE

Introduction — — — 1

General Abſtract of the State of Health for 1797 — — — — 11

Contagion — — — 32

Yellow Fever — — — 79

Small-Pox — — — 113

Epidemical Opthalmia, by Mr. James Reilly, Surgeon, Saturn — — — 128

On the Effect of Nitrous Acid in the Venereal Diſeaſe — — — 132

Miſcellaneous Communications and Remarks 141

Diet — — — — 157

Malignant Ulcer — — — 170

Experiments on the Nitrous Gas, by Mr. James Reilly — — — 232

Caſe I. Fracture of the Cranium, by Mr. C. Reynolds, Surgeon, Blenheim — 246

Caſe

PAGE
Caſe II. Fracture of the Right Arm, Amputation of the Right Fore-Arm and Left Hand, &c. by Mr. Robert Dunn, Surgeon, Stag — — — 249
Caſe III. Fracture of the Cranium, by Mr. Robert Carruthers, Surgeon, Unicorn 253
Caſe IV. Succeſſion of large Abſceſſes on the upper Part of the Thigh, by the ſame 256
Caſe V. Locked Jaw, by Mr. Ralph Cumming, Surgeon, Hind — — 259
Circular Letter — — — 267
Errata in former Volume, and Anſwer to Correſpondents — — — 273

APPENDIX.

Mitchill's Defence of the Soap and Candle-Makers — — — 275
Diſſertation on Peſtilential Fluids by Dr. Saltonſtall — — — 306
Diſſertation on Peſtilential Fluids by Dr. Bay 385
Diſſertation on Peſtilential Fluids by Dr. Lent 435
POSTSCRIPT — — — 473

MEDICINA NAUTICA.

INTRODUCTION.

WHEN the former volume of this work was laid before the Public, we had ſmall expectations, from the general hopes of peace, that we ſhould ſoon find ourſelves in poſſeſſion of materials ſufficient for a ſecond. But much of our preſent matter has been deemed of ſuch importance, that it would have been improper to delay the publication any longer. We allude particularly to the papers that have been ſent to us from America.

We are neither too much elated with the ſucceſs of our paſt labours, or afraid of the fate of our preſent, to ſee any neceſſity for altering the plan of our undertaking. The naval ſervice during war has always held out an ample field for obſervation; but the reapers have not been many, and the gleaners but few. There are alſo few inducements to engage a man to ſtudy amidſt the tumult and buſtle of a ſea-life. The mind ought to be ſecure of its tranquillity, when it gives full ſcope to its reflections; and the ſight of an enemy, or the approach of a gale of wind, are ſo many interruptions to a train of thought, that it requires a degree of apathy, not often met with in the literary character, to rally at pleaſure. The world muſt therefore accept our preſent labours in the homely dreſs we are enabled to give them. The ſhip in which we embarked during the ſummer did not return to Spithead till the end of November, at which time we began to compile this volume: to ſpend eight months of the year at ſea, and the remaining four in ſevere ſtudy, is what our health and ſpirits are unequal to perform.

The original plan of arrangement is preſerved: a ſhort hiſtory of the health of the fleet is premiſed, which, from the ſmall number of ſhips employed, offers but little occaſion for remark. Some of the ſubjects of the former volume are reſumed, where there was a neceſſity for a fuller examination, or by the acceſſion of freſh facts. In the department of ſurgery, we have brought forward matter of inveſtigation, alike new and intereſting; and we have given the name of malignant ulcer to a ſpecies of ſore that has infeſted ſome particular ſhips in a manner that has excited ſtrong ſuſpicions of a contagious nature. This inquiry being now begun, we earneſtly hope that attentive obſervers will not fail to preſerve every fact that may tend to elucidate this hitherto unexplored ſubject, A few ſurgical caſes are introduced, which do equal honour to the Profeſſion, as to the gentlemen who have ſo ably and ſucceſsfully managed the cure.

On the whole, we truſt the contents of this volume will be an acquiſition of ſome valuable facts to the ſcience of medicine; and alſo a very favourable ſpecimen of the medical character in this department of the public ſervice. The numerous teſtimonies of friendſhip and regard which theſe communications have conveyed to us, as they ſurpaſs all our expectations, ſo they tranſcend our capacity for offering thanks. We muſt conſider ourſelves fortunate indeed, to be placed in a ſituation where our own ſtudies called forth ſuch encomiums, and where we have had the opportunity of encouraging thoſe of others.

In the Appendix we have inſerted a number of American communications on Contagion and the Fever which has lately made ſuch devaſtations in that country. They are entirely connected with our inquiries, and muſt go a great length in bringing them to a concluſion. We will not anticipate the opinion which our readers muſt entertain, on ſome prevailing modes of practice, when they peruſe theſe able diſquiſitions.

MEDICAL LIBRARY.

We now wiſh to call the attention of medical gentlemen in the Navy to a ſubject which we barely hinted at before—the eſtabliſhment of a Public Library, for books on Medicine, and its collateral ſciences, at the Royal Hoſpitals of Haſlar and Plymouth. We muſt here ſpeak as we have felt, from experience. The neceſſary books which every phyſician and ſurgeon muſt peruſe, in order that his knowledge may keep pace with the improvements of his profeſſion, are not only numerous but expenſive; a great part of them are beyond the reach of an individual; and, beſides, the apartments allotted for theſe officers in a ſhip put it out of their power to carry any conſiderable quantity with them. It muſt be obvious then to every one, that ſome eſtabliſhment of this kind is highly practicable; and we ſhall briefly ſtate our plan.

On the part of Government, let one of the corner rooms of Haſlar be granted for the purpoſe, and alſo 40l. per annum, with the houſe proviſions, and a cabin, be allowed to ſome perſon to act as keeper. The phyſicians to fleets, phyſicians and ſurgeons of hoſpitals, and ſurgeons of the navy, ſhall allow the ſum of five ſhillings, when actually employed, out of their annual pay, for the purchaſe of books; and only theſe gentlemen ſhall have admiſſion to the library. It ſhall be open every day in the week for eight hours.

The phyſicians to fleets, phyſicians and ſurgeons to hoſpitals, ſurgeon to the flag-ſhip of the commander in chief at the port, and the two ſenior ſurgeons for the time being, ſhall be a committee to tranſact the whole buſineſs of the library.

The commiſſioners of the navy ſhall deduct five ſhillings from the annual pay, which ſum ſhall be ſubject to the diſpoſal of the committee at their quarterly meeting.

Some of the periodical publications ſhall be taken out, and lie on the table of the library. No member ſhall be allowed to carry a book out of the room.

The arrangement of ſuch a buſineſs, on theſe premiſes, would ſurely not be very difficult; and we cannot doubt that ſuch a plan would meet the approbation of the Lords of Admiralty, and every Board connected with naval ſervice.

Should ſuch an eſtabliſhment meet with that ſupport it appears to merit, the author will moſt cheerfully contribute the whole of the medical books he has accumulated during the war.

CLINICAL LECTURES.

A ſhort time before I left Haſlar Hoſpital, I had projected a plan of a Clinical Ward, after the model of the Royal Infirmary at Edinburgh. It was intended to ſelect from the patients in the north wing, which contained the wards belonging to me, ſuch caſes as might afford matter for animadverſion, or particular modes of treatment. It was alſo intended, that a large book, in which was to be regiſtered the hiſtory of every caſe, with the appropriate method of cure, ſhould lie on the table, and be open to the inſpection of every medical gentleman belonging to the building, and alſo to the ſurgeons and ſurgeons' mates of the navy, who might viſit the ward occaſionally. I had made a beginning in this buſineſs at the time I was promoted to the fleet; the manner in which it was conducted, afforded much ſatisfaction to the young men attending my patients, who met me in the Clinical Ward at a regular hour after the buſineſs of the morning. Once a week, or once a fortnight, a ſummary of our caſes would have made the ſubject of a lecture to be carried on throughout the winter, according to the uſual form of ſuch inſtitutions.

We take the liberty of mentioning this, as it will be generally admitted that the naval hoſpitals are, of all others, the beſt ſuited for an eſtabliſhment of this kind, in ſurgery as well as phyſic; and I leave it to thoſe who are moſt competent to decide, whether the public ſervice would not derive uncalculable advantage, by converting them into a ſeminary of education for navy ſurgeons. To give this plan due ſupport, it would be neceſſary for Government to allow a certain ſum to the phyſician and ſurgeon who undertake the reſpective Clinical Wards and Lectures. The Operation-room in the centre of the building at Haſlar is already commodiouſly fitted for a large audience.

At a General Meeting of the Surgeons of his Majeſty's Ships at the Cape of Good Hope, aſſembled for the purpoſe *,

It was unanimouſly reſolved,

That a gold ſnuff-box be preſented to Dr. Thomas Trotter, phyſician to the fleet, in teſtimony of profeſſional abilities ſucceſsfully directed to the welfare of the Britiſh navy: and in gratitude for long and unwearied exertions in behalf of the ſurgeons; and that Mr. M'Callum be requeſted to preſent the ſame in the name of this meeting.

" SIR, Cape of Good Hope, June 1, 1797.

" The real happineſs which I feel in communicating to you the deep ſenſe of gratitude and eſteem

---

* (Signed,)

Mr. Shaw,	Tremendous.
Mr. Bury,	Sceptre.
Mr. Motherwell,	Jupiter.
Mr. Goldſmith,	Truſty.
Mr. Fullerton,	L'Oiſeau.
Mr. Anderſon,	Creſcent.
Mr. Gallahar,	Vindictive.
Mr. Thompſon,	Rattleſnake.
Mr. Rowlands,	Star.
Mr. Haines, (lately)	America.
Dr. Pattiſon, Dr. Wilſon,	Naval Hoſpital.
Mr. Fletcher,	Tromp.
Mr. M'Callum, (lately)	Tremendous.
Mr. Lind,	Saldanha.

of the ſurgeons of the little ſquadron now on this ſtation, for your able, unwearied, and in ſome meaſure ſucceſsful exertions to promote the general intereſts of the Britiſh navy; but particularly that department of it with which they are more immediately connected; can only be exceeded by that, which I am ſure you will more ſenſibly feel, on receiving ſo public, honorable, and marked a teſtimonial of it. At a meeting purpoſely held to take this ſubject into conſideration, it was unanimouſly agreed to preſent you with a gold ſnuff-box: and in the name of the meeting, I am directed to beg your acceptance of it, as a token of that ſenſe of obligation to you, with which they are ſtrongly impreſſed.

"With the moſt heartfelt ſatisfaction they have already obſerved a conſiderable improvement in the medical department, and in their hitherto neglected ſituation. To your unceaſing labours in their behalf they are ready to aſcribe a great ſhare of it; and to you they offer their unfeigned acknowledgments. Looking forward with confidence, from what has already been done; and relying on your perſevering exertions, of the continuance of which they gladly perceive an implied promiſe in your late publication, they do not deſpair of ſeeing the plan of improvement you have pointed out ultimately crowned with complete ſucceſs. That you may long continue at the head of that department, where you have been ſo deſervedly placed as the reward of induſtry and merit; and that you may, as heretofore,

fore, both by your example and precept, continue to infuſe and diſſeminate among the navy ſurgeons that laudable ſpirit of inquiry to promote the intereſts of medical ſcience, by a chaſte and faithful collection of facts, is the ſincere and ardent wiſh of thoſe, in whoſe name this letter is written, and of him who is moſt truly yours,

" GEORGE M'CALLUM.

" To Dr. TROTTER."

ANSWER.

" SIR, Portſmouth, Feb. 11, 1798.

" I have been favored with your letter of the 1ſt of June laſt, incloſing a reſolution of the ſurgeons of his Majeſty's ſhips at the Cape of Good Hope; and alſo the elegant preſent that accompanied it.

" It is no ſmall ſatisfaction to me to find, that the fruit of my profeſſional ſtudies has been favorably received by ſo reſpectable a part of the liſt of navy ſurgeons on a remote ſtation: and this teſtimony of their regard ſhall be preſerved in everlaſting remembrance.

" But while I receive with the utmoſt ſenſe of gratitude the aſſurance of eſtimation which their gift is meant to commemorate, I muſt beg leave to obſerve, that in any exertions of mine which the ſurgeons may pleaſe to think to have benefited their eſtabliſhment, I have been barely doing my duty; for the public ſervice can never be ſufficiently ſecured, till men of ſuperior abilities in ſcience are duly rewarded. It may be thought that medical men occupy but an inſignificant place, and fill but a trifling employment in the great ſcale of national buſineſs. But the complete prevention and eaſy extinction of ſome diſeaſes *, that on former occaſions baffled all naval operations, demonſtrate this to be a miſtake; and which, joined with the matchleſs diſcipline of our officers, at a momentous criſis, proclaim in emphatic terms to aſtoniſhed Europe, that *it is natural for an Engliſhman to live at ſea.*

" Accept my beſt thanks for the delicate and friendly manner in which you have communicated this information; and believe me moſt ſincerely yours,

" T. Trotter.

" To George M'Callum, Eſq."

---

* Scurvy and Contagion.

MEDICINA NAUTICA.

GENERAL ABSTRACT
OF THE
STATE OF HEALTH IN THE FLEET,
FOR THE YEARS 1797 AND 1798.

Concluſion of 1796.

December 18.

ARRIVED in port, the Fame and Juſte, from ſea, having left Admiral Colpoys off Uſhant. The latter ſhip had been fourteen weeks out, yet not a ſingle man was ſent to the hoſpital. Mr. Kenning, in his report, ſays: "The "health of our ſhip's company has been uncom- "monly good, conſidering the length of the "cruiſe. In the courſe of the laſt eight months "we have ſpent ſeven at ſea, conſequently the "people are much exhauſted, and ſtand much in "need of nouriſhment and vegetable refreſh- "ments. Twenty caſes of ſcurvy occurred in this "month, but were all cured on board."

The frigates ſtationed on the coaſt of France, at the iſle of Marcou, and blocking up the port of

Havre, uſually returned to Spithead, over-run with ſcurvy, from the length of their cruizes. At this time, however, it appears, that the diſeaſe is ſcarcely known, even in cruizes of ten and twelve weeks; counteracted, as the officers report, by the large allowance of vegetables now ſupplied when they return to port.

The Meduſa, a 50-gun ſhip, having been fitted at Plymouth as an hoſpital-ſhip to attend the fleet, I have been directed by the Lords Commiſſioners of Admiralty to take up my reſidence on board as ſoon as ſhe arrives at Spithead.

In the mean time, at my requeſt, their Lordſhips have been pleaſed to order the ſame *improved diet* to be ſupplied as was cuſtomary in the Charon, with the addition of a milch cow, which may be conſidered the laſt article of comfort that we can ſuggeſt as practicable to be carried to ſea: this gave all we could wiſh, without any unneceſſary refinement.

The froſt ſet ſeverely in about the beginning of this month; a fall of ſnow happened on the 23d, and a thaw on the 29th.

December 31ſt. Arrived a ſquadron under Vice-Admiral Colpoys, having been cruiſing off Uſhant for twelve weeks.

The good health which theſe ſhips enjoyed for ſo long a time, during the moſt inclement ſeaſon of the year, affords another and moſt deciſive teſtimony in favour of the preventive plan, and what may be effected by proper diſcipline. I ſhall here

inſ-rt

inſert a letter from Mr. Smith, ſurgeon of the London, the flag-ſhip; and another from Mr. Kent of the Marlborough.

"SIR, Spithead, Jan. 1, 1797.

"It gives me great ſatisfaction to acquaint you with the very healthy ſtate of the ſhip's company, during our very long cruize in the winter ſeaſon.

"We ſailed from Spithead the 15th of October, and arrived the 31ſt of December, being eleven weeks and two days. During the firſt eight weeks we had rather pleaſant weather, dry but cold, as the wind all that time was to the northward and eaſtward; or weſtward of South, with thick hazy weather, often rain, and ſtrong gales.

"As to our diſeaſes, they were few; ſome catarrhs, with pleuritic ſtiches, which ſometimes required V. S. and bliſter. Towards the end of the cruize, ſome few coughs, with ſlight febrile ſymptoms. A few venereal caſes became troubleſome, from the cold weather unexpectedly directing the mercury to the gums or bowels.

"The lemon-juice and ſugar was iſſued daily, and care taken that it ſhould laſt the cruize; the utility of theſe, together with the molaſſes, completely ſecured us all the time from a ſingle ſymptom of ſcurvy."

"SIR, Marlborough, Jan. 4, 1798.

"I beg leave to inform you that we ſailed from Spithead the middle of laſt June, ſince which we have been only ten days at anchor in Cawſand Bay, and four in Torbay. We got a ſupply of eight weeks lemon-juice and ſugar from the Powerful, which, I am confident, preſerved the Marlborough healthy, having for ſix months never more than twelve in our liſt, frequently only two. Such facts as theſe ſhew the neceſſity of ſupplying fleets at ſea with refreſhments. Our people then looked florid and healthy; but though they are ſtill in good ſpirits, yet they are much exhauſted in ſtrength, and their ſallow looks denote a want of freſh animal food and vegetables, which they now partake. We brought in only two ſcorbutics: no objects for hoſpital."

A fever in this cruize prevailed on board the Powerful. Mr. Collins remarks that twenty caſes occurred in October; in November only ſeven caſes; towards the end of December and beginning of January he had ſixty-eight caſes. The increaſe latterly he juſtly attributes to wet decks, confined air, the ſcuttles being ſhut, and the decks leaking above, during ſtormy weather. At this time alſo a dyſentery was aſſociated with the fever, and, no doubt, owing to the cauſes juſt mentioned. And I do not find from Mr. Collins's report that he ſuſpected any imported contagion: but he adds,

“ On our arrival in port, I ſent all the fevers “ (ſeventeen) and the only remaining (three) “ fluxes to the hoſpital; and continued to ſend “ all of the typhoid claſs, as ſoon as they complained, in order to get the ſhip clear from the “ *contagion.*” He makes no particular mention of the ſymptoms; but, in the only fatal caſe, there was a ſingular conſtriction about the fauces. The treatment was ſuch as we uſually approve.

He concludes, “ We were nearly fifteen weeks “ at ſea, without any ſupply of vegetables; yet “ we arrived without a ſingle ſcorbutic patient in “ the liſt, which evidently ſhews the utility of “ lemon-juice and ſugar; and by their aid I was “ enabled to cure ſome bad ulcers.”

It was remarked in page 160 of Med. Naut. that a contagious fever had appeared in the Glory, a very ſhort time before ſhe ſailed. There have been no freſh caſes ſince that period. Ten bad ſcorbutic ulcers were cured at ſea, which formed the ſick liſt during this cruize. When the Glory left Spithead, the *bilge-water* was obſerved to be remarkably offenſive: but, after being ſome time at ſea, this diſappeared; and, probably from the motion and agitation of the ſhip, was at laſt very pure and ſweet.

The Queen Charlotte carried to ſea the ſmall-pox contagion, which appeared very ſoon after leaving port. Mr. Caird traced it in the firſt caſe to Haſlar Hoſpital. Eight patients were infected, and by great attention and ſeparation was ſubdued at laſt. One boy died.

1797.

January 3d. Sailed from St. Helen's a ſquadron for the purpoſe of intercepting a French fleet with an army on board, that ſailed with the intention of invading Ireland.

February 3d. The ſquadron returned to Spithead, in good health, without meeting the French fleet.

The ſurgeons of the fleet at this time were ſerved with a new code of inſtructions from the Board of Sick and Wounded, which now had the appointment of ſurgeons and mates throughout the navy. We obſerve, among ſome alterations, a very complicated form of journal; and what is rather ſingular, a weekly account is required to be ſent every opportunity to the Board: the uſe of *nitrous gas* is alſo directed to be uſed to deſtroy contagion when it appears in his Majeſty's ſhips.

March 1ſt. Sailed ſixteen ſail of the line.

March 30th. Sixteen ſail of the line returned from ſea, generally in good health.

At this time there were forty ſail of the line in the Channel, or Channel Ports; the number of phyſician's patients at Haſlar amounted to four hundred! What town or village can produce ſuch health as this?

Some ſevere catarrhal complaints occurred during this cruize in March. For the laſt three weeks there prevailed heavy gales of wind, very cold weather, and much rain, for days together. The decks, in conſequence, were flooded with water. Mr. Smith of the London remarks, with his uſual accuracy, " that fluxes appeared imme-
" diately among the marines, from being lodged
" in a more expoſed part of the ſhip; and from
" wearing thin linen trowſers, when they ought
" to have had thick woollen ones."

I am now glad to find that thick cloth trowſers and jackets are, in future, to be iſſued to marines, as has been long the practice to ſeamen.

April 1ſt. During the laſt month a ſlight typhus appeared in the Minotaur, which extended to fifty caſes, and which Mr. Bell treated ſucceſsfully on board.

9th. This day Admiral Earl Howe, K. G. reſigned the command of the fleet.

His lordſhip for the laſt two years had been afflicted with ſevere attacks of gout, attonic and irregular, which were followed with much debility, approaching to a paralyſis of the lower extremities; and to be traced to a circumſtance that came within my own knowledge.

While the fleet, conſiſting of thirty-four ſail of the line and ſixteen frigates, lay in Torbay in February 1795, there happened a heavy gale of wind at S. E. which blows right into the bay. The danger to which the fleet was expoſed is inconceivable: the ſwell of the ſea was tremendous; many of the ſhips were driven into ſhallow water, and ſome parted their cables: the weather was very cold, with ſnow and ſleet falling. This happened in the morning early; but the wind gradually drew to the eaſtward, till it came off ſhore, and about ten o'clock it was moderate.

During this time, his lordſhip had expoſed himſelf too freely to the cold: but it is probable, that the anxiety of mind inſeparable from ſo trying an occaſion to a commander in chief, the enemy's fleet being at ſea, was the principal cauſe of inducing a ſtate of *attonic* gout. He was obſerved to be lame in walking in to breakfaſt next morning: his confinement afterwards was tedious and painful, which was borne with patience and fortitude peculiar to himſelf.

Thus retired from active ſervice, an officer, who has been the ornament of the nautical profeſſion and the Britiſh navy during a long life, and who will be the admiration of poſterity. While it falls to the province of the hiſtorian to appreciate the numerous improvements which Earl Howe has introduced into naval tactics, in the particular diſpoſition of the ſhips of his fleet, and his general method of manœuvring them, theſe pages will teſtify how much the health of the navy, and the comfort of the ſick, are indebted to his attention. Under his authority the ſubject has aſſumed a new aſpect; and changes have been effected of ſuch magnitude and general utility, that if the ſame ſpirit be preſerved in future armaments, projected operations are not likely to be defeated by the ravages of diſeaſe. With this good and great man the health and comfort of the people were his firſt objects: in the exerciſe of my official duty, I was commanded to make uſe of his name, on every occaſion; and in all my interviews with him for that purpoſe, I never came away diſappointed *.

May 1ſt. The Meduſa hoſpital-ſhip joined the fleet at St. Helens, now complete in every thing that I could deviſe, for the comfort of the ſick.

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* As we may not have occaſion again to mention the victory of the firſt of June, we muſt beg leave to contradict the ſtatement of ſome occurrences on that day, relative to the ſinking of the Vengeur. It was ſaid that the Frenchmen who went down in this ſhip, as long as their heads were above water, continued to cry aloud, "Vive la Re-"publique!" and with this expreſſion in their mouths ſunk to the bottom. Somehow or other this account got into the Engliſh newſpapers, and ſoon reached France. But the whole is a falſehood; and I have it from the authority of the officers who attended to ſave the people, and ſaw the diſmal cataſtrophe. The ſcene preſented a very different ſpectacle; all was horror and diſmay, and no ſuch words were ever uttered. Barrere in the Convention made a fine text of it, in expatiating on the *naval victory* of Jean Bon St. Andre; votive tablets were immediately decreed to the manes of the ſufferers, and a three-decker ordered to be built and called Le Vengeur. But things are ſtrangely altered ſince: the orator himſelf has been ſemi-exiled; Jean Bon St. Andre is now a priſoner in the Seven Towers; and poor Villaret, the brave admiral, is reaping his laurels on the burning plains of Cayenne!

About this time I was favoured with an account of a contagious fever that had prevailed for ſome weeks on board La Nymphe frigate. This ſhip, in company with the St. Fiorenzo, took, in the entrance to Breſt, two French frigates returning from Fiſhguard in Wales, where they had landed one thouſand ſoldiers all convicts, and from the priſoners it was thought this fever was conveyed to the crew of La Nymphe. It firſt appeared in two men who had been in one of the prizes, and ſoon extended itſelf to others. The priſoners were landed at Plymouth, where Dr. Harris, who attended the priſon, told me a conſiderable number of them died, and it was ſome months before the contagion was completely overcome. To the Plymouth hoſpital ſeventeen of La Nymphe's people were ſent: this was about the end of March: ſhe ſailed for Spithead; ſome were recovered on board, and one man died on the paſſage.

Mr. Outram obſerved nothing particular in the ſymptoms of this fever. He employed the nitrous fumigation of Dr. J. C. Smyth, as directed by the Commiſſioners of Sick and Wounded in their inſtructions to the ſurgeons. This proceſs, however, was interrupted by *occurrences* in the ſhip, and certainly was not properly practiſed, if it had poſſeſſed the power of deſtroying contagion. It, therefore, continued to ſpread, and numbers were ſent to Haſlar. Mr. Outram left La Nymphe at this time. His ſucceſſor did not join her till two months afterwards, who found the fever ſtill prevailing, and it was the beginning of September before it was completely extirpated: but more of this hereafter.

The contagion in La Nymphe was imported to the Defiance by a boat's-crew, who ſlept a night on board during a gale of wind that prevented them from returning to their own ſhip. The nature of it was very ſoon detected by Mr. Glegg, and from the attention that was paid to the ſubject by Captain Jones and his officers, it was overcome in due time, without extending far. The means uſed on this occaſion were the ſame as thoſe ſo often detailed in this work, and nothing more than the uſual routine of duty in a well-diſciplined ſhip.

4th. The fleet, conſiſting of nineteen ſhips of the line, are at this time in good health: but the deficiencies of complement have lately been filled up with indifferent landmen, raiſed by the towns and counties.

A quantity of ſheep, porter, and cyder, were at this time diſtributed to the ſhips of the line.

6th. Having recommended a trial of the nitric acid in the treatment of lues venerea, as directed by Mr. Scott of Bombay, in a late publication by Dr. Beddoes, I was at this time ſhewn ſome caſes by Dr. Browne, of the Royal Sovereign, where this remedy was tried. This ſubject is mentioned in a future part.

Dr. Browne had at this time alſo ſome patients with obſtinate ulcers, which were healing under a new mode of dreſſing, as publiſhed by Mr. Bayntun, ſurgeon in Briſtol. It conſiſts in bringing the edges of the ſore as near one another, by ſlips of plaſter and bandage, as the nature of the parts will admit: the bandage is to be kept wet by the frequent ſprinkling of cold water. Relief from pain, and the free uſe of the limb, were the almoſt immediate effect of this practice; the ulcer aſſumed a lively hue, and cloſed rapidly. It was ſurpriſing to ſee men, with ulcers on the legs of very conſiderable dimenſions, walking about with eaſe, that a few days before were confined to bed. This method has been ſucceſsfully imitated by many of our ſurgeons, to the vaſt relief of the ſeamen, and benefit of the ſervice. It is plain that the practice here recommended cannot be extended to all kinds of ulcers; but certainly ſurgeons have not ſufficiently availed themſelves hitherto in keeping the edges of old ſores as much in contact as may be.

17th. The fleet ſailed from St. Helen's.

21ſt. Five men in typhus were ſent from La Nymphe to the Meduſa. This ſhip had now ſent eighty men to hoſpitals ſince the middle of March, when the fever firſt appeared.

During this month there was much fine weather, and alſo ſome ſtrong gales of wind.

June 10th. The ſick of the fleet were this day ſent on board the hoſpital-ſhip, to the number of ſixty-five in all. Some bad caſes of malignant ulcer had been ſent on board before this time. The other diſeaſes were chiefly pulmonic complaints.

The ſhips particularly affected with theſe ulcers were, the Queen Charlotte, Royal Sovereign, Saturn, and Terrible. Theſe ulcers had nothing of the ſcorbutic appearance, but were rather granulated and florid on the ſurface, when not covered with ſloughs. Some of them began from blood-letting, others from bliſtering, many from ſlight ſcratches and bruiſes and burns; but moſt began from a ſmall pimple, of a livid colour, that quickly inflamed and ſpread, accompanied with ſymptoms of fever, often delirium, and intolerable pain. The ſpeedy converſion into gangrene and ſphacelus exceeded every thing I had ever witneſſed in ſurgery; for often, in the ſhort ſpace of a day or two, the whole integuments and muſcles of the limb ſeemed to drop away; and a caries of the bone often followed. In ſome caſes buboes became very diſtreſſing, from the abſorption of the matter.

During this cruize a typhus appeared in La Pique frigate; and ſome caſes of it were ſent to the Meduſa. Mr. M'Donald traced the contagion to the Royal William, by a draft of fifty-five raw landmen at the time ſhe came out of harbour. Early attention on the part of the officers and ſurgeon ſoon ſubdued it; and it did not affect any of the old ſtanders in La Pique.

"On my appointment to this ſhip in March laſt, "I found her in a very healthy ſtate; two were

" afflicted with chronic rheumatiſm, and two or " three had catarrhal complaints, not confining " any of them to bed. We continued in Portſ- " mouth harbour for two months (during which " time the ſhip was undergoing a repair). We " ſailed to Spithead very ſhort of complement; " but it was made up by a draft of fifty-five land- " men from the Royal William, and very badly " clothed. Two of theſe men were ſeized with " ſymptoms the ſecond day after being on board. " As ſoon as the nature of the fever was detected, " they were ſent to Haſlar, on the fourth day of " of their illneſs. Petechiæ, delirium, a black " tongue, great muſcular debility, with nervous " ſymptoms, exhibited themſelves. Three more " were ſeized at ſea with the ſame ſort of fever in " a very bad way, and ſeveral in a mild way. One " of the bad caſes died on board the thirteenth day " of his illneſs; the other two were ſent on " board the Meduſa: *none* of the old hands were " infected.

" Our chief prophylactics were, a timely ſepa- " ration on the attack; their bodies were well " waſhed with ſoap and water, ſick bedding ſup- " plied them, conſtant fires in the ſick birth, and " between decks, free ventilation by windſails night " and day, frequent ſcrubbing with warm vinegar, " and their own bedding was ſcoured and well " aired.

" W. M'Donald, Surgeon.

" *La Pique, July.*"

Twenty-one caſes were infected in all.

14th. The hoſpital ſhip left the fleet off Plymouth.

15th. Arrived at Spithead, and landed the ſick: the weather fine.

July 8th. Having completed our ſtores and neceſſaries, ſailed from St. Helen's to join the fleet.

12th. Joined the fleet in Torbay.

The ſcurvy had appeared in moſt of the ſhips during the cruize, but cured with eaſe on board.

16th. Received the ſick of the fleet, to the number of fifty-four, chiefly ulcers and pulmonic complaints.

17th. The fleet ſailed, and alſo the Meduſa with the above-mentioned ſick on board. Some caſes of ſyphilis were put on the nitrous acid ſince the 14th.

In ſome of the bad ulcers we obſerve that the free uſe of lemon juice has done harm, and has conſiderably added to the debility, when ſupport was required. On the whole, none of our preſent caſes are ſo bad as the former.

28th. Received the ſick of the fleet, who, with the number on board, amount to eighty-ſeven.

Diſcharged ten recovered men; four of whom were cured by the nitric acid of lues venerea.— Parted from the fleet off Uſhant at noon: this cruize fine weather.

29th. Arrived at Plymouth, and landed the ſick.

Mr. Smith, of the London, remarks, that during the laſt cruize he had ten caſes of typhus among landmen, who came from the receiving-ſhip at Spithead. In three the ſymptoms were ſevere, ſuch as ſtupor and ſubſultus tendinum; but they all recovered. One man in particular took no kind of ſuſtenance but porter, of which he drank three or four quarts in the day, and did well.

Careful ſeparation, in a cleanly and well-aired ſick-birth, were the chief means uſed here to ſtop the infection.

Auguſt 5th. Received the hoſpital ſtores, and ſixty ſheep to be diſtributed.

6th. Joined the fleet, and diſtributed the neceſſaries, vegetables, ſtock, &c.

20th. This day a ſeaman's wife was brought from La Pique, in the eighth month of pregnancy, ſubject to conſtant hyſterics, and inceſſant reachings and vomiting. She was allowed one of the nurſe's cabins, with ſuitable attendants. Theſe complaints had been of ſome weeks ſtanding, but ſeemed to increaſe as the *uterus* extended;

and ſhe was now extremely miſerable. The uſual routine of medicines, opium, caſtor, aſafætida, camphor, æther, &c. were tried in vain: lying on her back, with the pulvis ſomewhat elevated, was the only poſture that gave any relief. Every thing in the way of diet was quickly thrown from her ſtomach, and ſhe ſeldom ſlept. In this ſtate ſhe continued till the ſhip came to Torbay, where ſhe had relations, and was delivered of a healthy child the morning after ſhe landed: from this time all her complaints ceaſed.

22d. Received among others, a caſe of confluent ſmall-pox from the Mars.—(*Vide article* SMALL-POX).

25th. The fleet returned to Torbay: at this time twenty-eight on board the Meduſa.

It appears that few general diſeaſes have been known during this cruize, except pectoral complaints: the ulcers of the malignant kind were happily cleared by the laſt number the Meduſa carried to port; and none of any conſequence are now in the ſhips. The pulmonic affections are, however, very numerous, and chiefly to be imputed to the weather, which has been unuſually cold for the ſeaſon. Bleeding early, with other evacuations, was remarkably beneficial; if delayed for a few days, it ſeemed in many caſes to do harm, even when there were apparent ſymptoms of conſiderable excitement and ſtricture about the præcordia. Many of theſe caſes terminated in confirmed phthiſis and hectic. Some of them were diſtinguiſhed by pale countenances, low ſpirits, and conſtant ſickneſs at ſtomach, with univerſal langour and debility. The ſtricture at the breaſt was frequently relieved by inhaling æther, as recommended by Dr. Pearſon, of Birmingham; which was alſo given with ſucceſs inwardly for the ſame ſymptom. The trials of inhaling the æther were, however, on too narrow a ſcale of practice for me to have troubled that reſpectable phyſician with a particular communication on the ſubject.

In theſe caſes, where the inflammatory diſpoſition was ſoon overcome, ſtimulants with wine were reſorted to with much benefit: but the nouriſhing and delicate hoſpital diet was here, as in all afflicting circumſtances, of the firſt importance. The milk and eggs enabled them to have a change of pudding, and ſometimes a cuſtard every day, ingredients rather new in ſea-diet, but which were prepared with little difficulty.

In my general viſit to the fleet at this time, there appeared an unuſual deſpondency and dejection of ſpirits among the patients in the different ſick berths. The outrageous fury of late proceedings had ſubſided; and the horror induced by ſome awful examples of puniſhment was now operating. When ſome of theſe caſes were moved to the hoſpital-ſhip, we found not a few of them ſubject to very frequent fits of hyſteria; and where this ſingular affection recurred with as much violence of convulſion as we have ever marked it in female habits, attended with globus, dyſphagia, immoderate riſibility, weeping, and delirium. The ſame ſympathy ſeemed to extend from one to another, as is often met with in the fair ſex; three or four were ſometimes in the fit at once; and the propenſity of being affected, by looking at others, became ſo common, that we were under the neceſſity of laying them at as great a diſtance from one another as poſſible.

I could not explain this extraordinary complaint among our patients in any other way, than reſolving it to the effects the late tumults in the fleet had made on the feelings of the people. There were ſubject to theſe fits men of very different diſpoſitions, as far as I could learn and judge of their characters. Some, whoſe mild and peaceable deportment appeared to have ſuffered from the alarm which a ſyſtem of terror practiſed around them had produced; and which had kept them in a ſtate of conſtant dread and apprehenſion. But there were others, who had been active leaders in their ſhips, and the foremoſt in every outrage that was committed. The fear of puniſhment, if not remorſe of conſcience, acted here as a prediſpoſing cauſe. On the whole, we had no reaſon to think that theſe men were playing tricks; the reality was too apparent.

September 1ſt. No freſh caſes of ſmall-pox appeared in the Mars at this time, and ſhe was conſidered ſafe.

2d. Stock, fruit, and vegetables, were diſtributed to the fleet for next cruize.

11th. A gale of wind from S. E. in which moſt of the ſhips parted their cables, but were brought up again without injury.

The ſick on board the Meduſa eighty-three, have ſuffered much from the motion of the ſhip during the late gales, by taking in water at the ports, &c.

24th. Hoſpital-ſhip ordered to Plymouth, proviſions and neceſſaries being reduced to three days allowance.

25th. Arrived at Plymouth, by a fortunate ſlant of wind in the night, having ſailed with the wind againſt us: to have kept the ſea long under ſuch conditions of the ſick, would have been miſerable indeed. Landed the ſick.

October 9th. Sailed from Plymouth, ſtored.

10th. Joined the fleet off Uſhant, and diſtributed lemon-juice, vegetables, and ſurgeons neceſſaries to the ſhips, all of whom were in good health.

November 4th. Returned to Plymouth with a diviſion of the fleet under Sir A. Gardner, with only twelve ſick on board, ten of whom were landed, and two venereal caſes taking nitric acid reſerved, ſeemingly doing well.

18th. Arrived at Spithead, about which time the fleet came into port.

January 1ſt, 1798. The winter hitherto mild, and our ſhips in good health.

The occurrences of 1798 come chiefly under the heads of malignant ulcer and ſmall-pox; but from the diſmiſſion of the hoſpital-ſhip, a much larger number of ſick have been ſent to the hoſpitals than ever occurred before; more have died in their own ſhips, and a larger proportion invalided than in any ſummer during our attendance, although general diſeaſes have been out of the queſtion, the malignant ulcer excepted.

◆

MEDICINA NAUTICA.

CONTAGION.

WE reſume our ſubject.—In our former animadverſions on contagion, we confined ourſelves chiefly to what was of a practical nature, by laying open the various forms we had ſeen it aſſume, the manner of its propagation, the means of ſubduing it in the beginning, and of fortifying the human body againſt its influence. In all this we had little concern about accurate arrangement, as long as we were correct in ſtating facts: and as we had no theory to ſupport, we were, therefore, little ſtudious of method.

But although our labours have produced a larger maſs of evidence on the infection of typhus, than moſt preceding writers had done, yet our practice was by no means ſuch as has been generally adopted in the prevention and cure by other phyſicians. We were not, however, ſo confident in our abilities, as to ſuppoſe we ſhould eſcape criticiſm, if not reprehenſion, while we endeavoured to overturn prejudices (for we cannot call them deductions from matter of fact,) that have from time immemorial directed the means for deſtroying and purifying contagion.

When I came into the navy as a ſurgeon's-mate at Chriſtmas 1778, I was a very young man, but had about me a little curioſity on profeſſional ſubjects. At that time ſeveral ſhips had contagious fevers on board, derived from various ſources, and the fumigating proceſs was every where faſhionable; ſo much ſo as to engroſs the ſole attention of every perſon on board, as being certain in the iſſue. The Berwick of 74 guns, to which ſhip I belonged, previous to my joining her had been infected, though not badly: but in order to prevent contagion, and to purify the decks from unwholeſome air, fumigations of different kinds were regularly performed once or twice a week: camphire, to a great amount, was ſometimes the burnt-offering on theſe occaſions. The infected ſhips, I obſerved, continued for months together under this operation; and many of my readers may remember the tainted hulls laying in remote corners of the harbour with the ſulphurous fumes exhaling from their chinks every morning, for five or ſix months; and unfit for ſervice. It was impoſſible to behold ſights of this kind without ſome degree of concern; and they very naturally excited reflection. Infection appeared to me a very wonderful agent: what can it be? and how do the fumes of ſulphur and exploſions of gunpowder deſtroy it? Theſe were queries I was conſtantly putting to myſelf, and aſking others. No medical acquaintance round me, and no medical author that I could ſee or hear of, could ſolve my difficulties. As for the fumigations, they all agreed that they were the moſt effectual purifiers; but none of them could explain the *modus operandi:* it was an ultimate fact. As I grew older, and as I thought wiſer, I became more ſceptical: till, without all reſerve, at laſt, when I could meet with no explanation, I pronounced the whole to be downright empiriciſm; and experience and obſervation ſoon confirmed my unbelief.

It is eaſy to ſee how fumigations, and ſubſtances yielding ſtrong perfumes, were firſt employed for this purpoſe. The plague, and other diſeaſes attended with great mortality, in days of old, were looked upon as judgments commiſſioned by the hand of Divine vengeance to ſcourge the human race: hence ſacrifices and expiations were made to the gods, to deprecate their wrath, and atone for the guilt of mankind. Sweet-ſmelling herbs and flowers, and aromatic gums, as myrrh and frankincenſe, made part of theſe ceremonies: and as the whole were of an agreeable flavour, and covered the offenſive effluvia of diſeaſed or corrupting bodies, it was natural, among nations unacquainted with chemical reſearches, to believe that theſe fumes, by changing the ſmell, corrected alſo the polluted atmoſphere. Thoſe diſeaſes were obſerved to be the offſpring of putrid and putrifying animal and vegetable ſubſtances: they ſaw ſuch ſubſtances become a *nidus*, and the nouriſhment of numerous young inſects, and concluded that this generation was ſpontaneous, becauſe natural hiſtory and experimental philoſophy had not yet inſtructed them better. Animalcules, therefore, in ſuch ſituations, in a warm climate, increaſe and multiply with wonderful rapidity, ſo as in ſome ſeaſons to conſume the whole vegetable productions of a country. To deſtroy theſe animalcules, which, now on the wing, they conſidered as polluting the atmoſphere, brimſtone and fire would quickly be reſorted to; for it was known that no animal could approach their conflagration: and every article that yielded either pungent vapours, or agreeable odours, was thus called in to their aſſiſtance; hence the hyſſop of the wall, the cedar of Lebanon, the camphire of Engedi, the ſpices of the merchant, the pitch of Norway, the tobacco of Virginia, &c. ſwell the antipeſtilential catalogue.

Theſe ſubſtances that were employed for fumigation, it thus appears, have travelled down to us from the days of Greece and Rome, and the rites of the Jews, through the Arabian phyſicians, and the dark ages of Europe; and have retained their reputation and character amidſt all the viciſſitudes of human opinions, and the fleeting duration of medical theories. No one, till lately, had dared to queſtion a practice ſanctioned by the authority of antiquity, and the univerſal ſuffrage of modern phyſicians.

It required no prophetic knowledge to foreſee that the beautiful diſcoveries of pneumatic chemiſtry would be ſoon inliſted under the banner of prophylactics againſt peſtilential diſorders; and alſo be employed to account for the diſeaſes themſelves. The pneumatic doctrine explained to us, for the firſt time, the compoſition of elaſtic fluids. The ſulphurous fumes had been long employed againſt infection; and analogy ſoon taught philoſophers that the muriatic acid gas, and the nitrous gas, might be equally ſucceſsful. The firſt was employed by the French phyſicians, the latter from the authority of Dr. Smyth; but it is ſaid to have been recommended nine years ago by Dr. Johnſton of Worceſter. We do not find, however, that either the French phyſicians, or Dr. Smyth, have given us any accurate or ſatisfactory explanation of a contagious atmoſphere; certainly none of their predeceſſors in fumigation have done it. Dr. Smyth, indeed, ſpeaks of its origin in putridity; but that is nothing more than what was known to the rudeſt ancient; and we are yet unfurniſhed with any preciſe idea on the ſubject. Chemiſtry being a ſcience of facts that leaves nothing to conjecture or ſceptical reaſoning, ſhould have demonſtrated the matter beyond a doubt: for the laws of attraction, as applied to the gaſes, are ſufficiently plain; and it is rather unworthy of modern improvements to expel an elaſtic fluid from the alembic, and not be able to underſtand what combinations it may have formed after its departure, or to what ſtate it returns. The theory of fumigation, therefore, either ſtill leans to the animalcular doctrine, or it is practiſed by equally untenable authority, *ſervile imitation.*

In the month of January 1793, a typhus contagion appeared in one of the ſecond rates, that was about to be paid off; and was afterwards carried by part of her crew on board the Valiant, a 74, commanded by Captain Pringle, now a Rear Admiral. I was at that time phyſician to the Royal Hoſpital at Haſlar; and from having attended ſome of the caſes ſent on ſhore, before the diſtribution of the people, I could not help appriſing the intelligent Commander of my opinion on the fever, and giving my advice what was beſt to be done. No copy of my letter was kept, for it was written on the ſpur of the moment: but I remember of having ſtated to Captain Pringle, with other particulars, that I had *no faith* in the fumigating proceſs; and only ſaid, if he was partial to it, to beware how he expoſed his people to the weather above, while the hatches were ſhut to confine the vapour below. I mention this to ſhow that my oppoſition to all unreſpirable and noxious fumes had been decided long before the public Boards had given the preference to Dr. Smyth's corrector, and ordered it to be introduced into the navy. My appointment as phyſician to the fleet, ſhortly after this, under the command of the revered Admiral, that fully confided in my profeſſional capacity, afforded me the free exerciſe of my opinions, and which led to that ſucceſsful practice now before the public. The attention of every Officer in the fleet, and the ſuſpicion of a few, was directed in watching the iſſue of our meaſures, at a period highly intereſting to the country, from a general contagion; and they were not diſappointed. Opinions, formed and matured in the manner theſe have been, cannot be eaſily controverted.

Having no perſonal acquaintance with Dr. J. C. Smyth, I could have no private reſentments to gratify in oppoſing his doctrines. I admire his profeſſional talents, and have a high opinion of the goodneſs of his heart; for theſe are amply conſpicuous in his writings. Few phyſicians have been more fortunate in their friendſhips than I have been; and few have leſs reaſon to be jealous of others; for my appointment took place under the Union flag of Great Britain, confeſſedly the higheſt medical ſtation in the public ſervice. In all my official engagements I have been loaded with every token of regard from the Officers and ſeamen; and amidſt all the changes it has been my duty to effect, I have, as might be expected, met with much aſperity, but I hope, few enemies. With what juſtice then could it be ſurmiſed, that I oppoſed improvements, from motives not avowed? Yet it is admitted immediately afterwards, that I had ſufficient reaſon for preferring my own method of expelling infection. It would indeed have been hard to diſprove that, for there was a healthy fleet at Spithead to demonſtrate the fact. But the plain truth of the matter was, thoſe phyſicians had previouſly committed themſelves by looking upon the experiments of the nitrous gas in the Union, as full teſtimony in its favour. We conſcientiouſly did our duty; however our arguments may fail, *impar congreſſus*

congreſſus Achilli; we conceived that truſting to fumigation in former times had often paralized the arm of war; and we at this moment think, that the nitrous gas has, and is ſtill doing harm, notwithſtanding the certificates in its favour that are daily tranſmitted to the Board of Sick and Wounded*.

My letter to Mr. Nepean, on the ſubject of Dr. Smyth's pamphlet, was certainly never intended for publication at the time it was written. But being addreſſed to the Secretary of a public Board, and where there was ſome neceſſity of making the ſubject familiar to their Lordſhips, I did not find myſelf ſtrictly confined to the rules of technical preciſion in language; and therefore the chemiſtry of it has been found fault with. Since it was laid before the public, it has ſcarcely been treated with the candour which might have been extended to a haſty production, and compiled with all the hurry of official communication. We are, however, ſtill diſpoſed to defend the practice as there delivered; for we think, from recent experience, it is ſufficiently correct.

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* Very ſhortly after my circular letter was ſent to the Surgeons, a letter from Mr. D. Patterſon to the Board, in a printed form, was diſtributed from the flag-ſhip to the Captains. The following paragraph is twice or thrice repeated: "Nitrous vapour may not only be conſidered the *moſt convenient*, the *moſt elegant*, and the *moſt ingenious*, but alſo the *moſt efficacious remedy*, for the purpoſe of counteracting different ſpecies of contagion, that has yet been offered to the public." *Ab uno diſce omnes.*

The ſmall publication, containing the account of experiments made on board the Union hoſpital-ſhip, with a view to aſcertain the effects of nitrous gas in deſtroying contagion, was firſt put into my hands by a phyſician now attending a ſquadron of his Majeſty's ſhips on a foreign ſtation. That gentleman, like many others, was ſurpriſed at the doubts I expreſſed on the ſubject; for he, like them, looked upon the narrative as demonſtrative evidence. And I truſt it will be now made appear, that the experiments themſelves by no means carry that conviction.

We are there informed, that Mr. Menzies arrived at Sheerneſs on the 24th of November, provided with the neceſſary ingredients and utenſils for diffuſing the nitrous gas in the wards of the Union hoſpital-ſhip. He prefaces his experiments with ſome general remarks on the malignant fever then prevailing, and the condition of the wards. He wiſely recommended ſome beneficial changes in theſe apartments; and ſome of his obſervations there, for the credit of ſervice, we wiſh never to have been laid before the public. The wards, it appears, had begun to be occupied by the infected Ruſſians *early* in September. This was nearly three months before, during which time ten women were ſeized with the fever, three of whom died; and twenty-four of the ſhip's company, of whom three died. It is very natural to aſk, how theſe thirty-four people were affected by the contagion more than the reſt of the ſhip's company; and the reaſon is obvious: they had that *prediſpoſition* that invites infection, if I may ſo ſpeak, and the greater part of them were immediate attendants on the ſick. Now it is eaſily to be diſcovered, by perſons accuſtomed to inveſtigate circumſtances which uniformly accompany all general infections, that the patients firſt taken ill were either more expoſed to the contagion, or people of ſad and timid diſpoſitions, full of apprehenſion, and at that period of life, from fifteen to thirty-five, that is eſpecially liable to febrile affections. The debility that ſucceeds to ebriety gives alſo a ſtrong pre-diſpoſition; and we ſee how earneſtly Dr. Smyth and his co-adjutors adduce this, as pre-diſpoſing a marine who was infected after the diffuſion of the gas; although there is not a word of the kind in all the other inſtances of fever that had, previouſly to this period, taken place among the women and men. Now we inſiſt, that the uninfected remainder of the ſhip's company muſt have been ſaved by keeping at a diſtance; or they muſt have been habits of body different in condition from what is mentioned above; and theſe reaſons are ſufficient to account for their exemption, and ſolve the problem completely. This fever had now been three months in the Union hoſpital-ſhip, and probably much longer on board the Ruſſian men of war; it was therefore arrived at that good old age, which we call decline, and when it muſt ſoon die a natural death. And there can be no doubt but it was prolonged in the Ruſſian ſhips, by going again to ſea before being cleared, as immediate ſeparation was then out of their power. Every perſon who had the pre-diſpoſition about them that favours the reception of contagion, muſt in ſo long a time have ſuffered an attack; thoſe who poſſeſs this pre-diſpoſition in its moſt exquiſite degree would be firſt taken ill; next would follow thoſe who had it in a leſſer degree, and ſo on till its progreſs was arreſted by meeting with habits that reſiſted its influence, and that could by cuſtom breathe a contagious atmoſphere with impunity.

We thus ſee that it is not a correct method of canvaſſing evidence, during the rage of a prevailing fever, on the validity of any prophylactics, if their uſe had been begun at a period when the infection is ſuppoſed to be naturally on the decline; and when it has exhauſted the ſubjects or conſtitutions which it more eaſily affects. Such, from the evidence produced by Dr. Smyth, we contend to have been the caſe on board the Union, when Mr. Menzies began his experiments.

Theſe animadverſions apply exactly to the extinction of the fever in the Ruſſian ſhips. Some few caſes, it would appear, had been ſent to the Union, about the beginning of January; theſe could not be very ill; for on the 3d of February Mr. Baſſan informs Dr. Smyth, it was totally extinct. We alſo ſee that there were little ſickneſs in any of them at the time Mr. Menzies returned to London about the end of December: he ſpeaks particularly of the offenſive ſmell from the *ſhubs* or great coats. On the whole, it is clear that this contagion was on the decline *by nature*, when the nitrous fumigations were begun in the Union, and nearly extinct in the laſt Ruſſian ſhip before it was tried, but in all the others had previouſly diſappeared. There was indeed full time for any contagion to have ceaſed (for it had prevailed for four months), even if the advantage of moving the infected to the Union had not been duly directed, and had not aided the extinction.

Let us now examine the account given by the experimenters, on the diffuſion of nitrous gas, purifying the air, and correcting the putrid and offenſive ſmell. When we enter an hoſpital ward, where ſick men are collected from other quarters, for the better chance of recovery we naturally ſuppoſe a pure air requiſite, for pure air is the food of life; and if this be not continued, the ſick muſt ſink, and the healthy become diſeaſed. Theſe wards, Mr. Menzies remarks, had an offenſive ſmell; no wonder that thirty-four people belonging to the Union had ſickened; it came chiefly from the neceſſaries, which he found unpardonably filthy, and unaccountably neglected. Mr. Menzies very judiciouſly begun his experiments, by getting theſe nuiſances altered: it probably prevented all the remaining people from being infected. A phyſician pays but a ſorry compliment to the ſuperintendants of any hoſpital, when he comes to correct the foul air of the apartments by chemical agents. The Union at this time was lying at her moorings, and in the ſmooth water of Sheerneſs harbour: if offenſive ſmells were iſſuing from the bodies of the patients, and if the ſeats were allowed to accumulate filth, were there no air flues, no ports, or ſaſhes, that could be thrown open, to invite the refreſhing and health-giving breeze, and to expel the contaminated portion from within? This might have been done, I apprehend, without expoſing the ſick to exceſſive cold; for there was no occaſion for keeping them conſtantly open; but there was certainly a neceſſity for opening them at intervals, in different parts of the deck, whenever the air became tainted; which was a more efficacious part of cure than any article of medicine that could come from the hands of their apothecary. This offenſive effluvium, ſo diſagreeable to ſmell, it plainly appears, was *ſulphurated hydrogenous gas*, (hepatic gas,) the aërial product of fœcal matter, and ſuch as aſcends from privies. It was indeed fortunate for the temporary reputation of Dr. Smyth's corrector, that this gas compoſed the tainted atmoſphere; for nitrous gas poſſeſſes the power of decompounding it, and forming thereby new combinations that yield nothing offenſive to the olfactory nerves. It is true that other ſubſtances, ſuch as phoſphorus and carbone, might alſo be mixed with the hepatic gas; but on the hydrogenous portion the nitrous gas chiefly acts, and the ſulphur is precipitated, and with it the foul ſmell. In this manner nitrous gas alters the effluvia of confluent ſmall-pox, when they approach beyond maturity; and alſo the offenſive matter of large ſloughing ulcers, which do not materially differ from the vapours that riſe from the fœcal maſs. In the ſmall-pox, it was lately employed for the purpoſe of deſtroying the infection

tion on board the Captain at ſea; the ſmell, as might be expected, diſappeared, but the contagion extended to other people, and was not got under till the ſhip returned to port. But this was no purification of tainted air, for it imparted no addition to the empyreal portion; and we think the effluvia would be more rationally expelled by free ventilation.

So abſurd and inconſiſtent are prevailing opinions and habits of imitation in particular affairs, among mankind, that what is called a poiſon one day, may have the chance to be vended as an infallible remedy the day after. The ſulphurated hydrogenous gas we have juſt mentioned, when mixed with a proportion of carbonic acid gas, is no other than the aërial vapour produced from the exploſion or combuſtion of gunpowder, which has been ſo long uſed in his Majeſty's ſhips for the deſtruction of contagion. It affords an ample but lamentable proof of the wavering and imbecility of all human reaſoning. Dr. Smyth himſelf, we are very apt to believe, muſt have been ſtrongly impreſſed with the dread of unfolding the weak ſides of his doctrine, that he ſays nothing of the primitive principles of his nitrous gas. That muſt have ſoon reduced him to inexplicable difficulties; for he muſt have ſought its conſtituent parts in the final decompoſition of animal matter, by putrefaction; and after being evolved from his pipkins, whether in ſhips or hoſpitals, from its well-known elective attractions, he muſt have traced it through all its various degrees of oxygenation, till it became nitrous acid, without imparting a ſingle quality to the air to ſupport life; but on the contrary, to render it ſo much the worſe, by the quantity it required to bring it to the ſtate of an acid.

Something is ſaid of the condition of the ſick being meliorated by the nitrous gas. We have no doubt but the ſingularity of the buſineſs, and the apparatus which Mr. Menzies brought with him, muſt have engaged the attention and amuſed the minds of patients and by-ſtanders: their ſpirits were likely to be elated by the confidence of receiving benefit from a fume which burſt from the pipkin, as if by the magic command of the experimentor, and which, to illiterate ſeamen and booriſh Ruſſians, muſt have appeared a ſupernatural power. But where is the fact to prove that the vital portion of the air was increaſed: the noſe is not to be conſidered the chemical teſt of the preſence and abſence of oxygene. It encouraged the nurſes and attendants to pay more attention to their duty; certainly, the offenſive ſmell which ought to have been prevented from taking place by other means, was now decompoſed; but in other reſpects it muſt have acted like a charm, and thus rivalled the holy water of the Ruſſian prieſts. For my own part, I never ſee or hear of the operation for diffuſing the nitrous gas in his Majeſty's ſhips, and the arrangement of the pipkins, but it brings to my remembrance the proceſſion of images and crucifixes in Roman-catholic countries, which are carried about the ſtreets by prieſts and friars, to deprecate Divine vengeance, during peſtilence and famine, or ſome dreadful convulſion of nature; and I rather ſuſpect that their effects are much alike on the minds of the beholders: *Qui vult decipi, decipiatur.*

After all the latitude which the advocates for fumigation have thus given to its properties for purifying the air and preventing diſeaſes, it can certainly never be employed in healthy ſhips for any reaſon yet produced from experience or from chemiſtry. In crowded ſituations, when the vital portion of the atmoſphere is diminiſhed by reſpiration, it can only be repleniſhed by a freſh column from without, or by ſome proceſs giving out oxygene. Nitrous gas, though poſſeſſing it in combination, cannot give it out under theſe circumſtances; on the contrary, it tends ſtill more to leſſen the reſpirable portion from its ſtrong attraction for oxygene, which it greedily combines with to the point of ſaturation. This quality of nitrous gas has been ſo generally noticed by chemiſts, that it is employed every where as an eudiometer for meaſuring the purity of any given quantity of atmoſpheric air; and is, I believe, the ingenious invention of Dr. Prieſtley.

The noxious quality of foul air generated in a ſhip's well or hold, differs materially from the unreſpirable part of common air that may be accumulated in the upper decks. The former is no other than the *choak damp* of mines, the carbonic acid gas of modern chemiſts. It cannot be detected by ſmell, as the offenſive hepatic gas may be done; and men and other animals are thus often killed in an inſtant, which frequently happens to carpenters, when the well has been long neglected in ſhips. On this kind of foul air nitrous gas cannot act, and can never be employed to expel it by any perſon acquainted with its elective attractions. Being readily miſcible with water, it is diſlodged from the well and hold of a ſhip by letting in pure water, and pumping it out again. Its preſence is eaſily detected by lowering a lighted candle and lantern into the place where it may be ſuſpected; the flame is extinguiſhed, as it is incapable of ſupporting combuſtion. This lethalic gas is generated in the holds of ſhips by the decompoſition of moiſture, but particularly beer, ſugar, or other articles prone to fermentation, if caſks happen to leak or to be ſtove. But ſalt or freſh water acting upon timber, or any vegetable ſubſtance, ſoon evolve it in great quantities; and being of greater ſpecific gravity than common air, it occupies a lower ſtratum, and is always found at bottom.

We thus ſee that nitrous gas poſſeſſes no qualities for correcting contagions, more than the other gaſes employed by Lind and former phyſicians; and we think it has been brought into general uſe on very ſlender arguments in its favour, or rather from the evidence having undergone a very ſuperficial examination. What has been thought the ſtrong hold by its defenders, is the change of ſmell on its diffuſion throughout the wards: but we have already ſaid this is not an accurate chemical teſt. A very ſmall proportion of ſulphurated hydrogenous gas (hepatic air) will render the air very offenſive to the olfactory nerves, when it has little or no effect on the reſpirable part, and will not be perceived by the lungs. The reſiduum of air lowered by reſpiration is ſcarcely perceptible by ſmell; but the action of the lungs in inſpiration is quickly affected, and a difficulty of breathing follows. Nay, carbonic acid gas has no ſmell whatever; yet, when taken into the pulmonary organs, it kills inſtantly; its taſte is acidulous in water. On the other hand, a pure atmoſphere, with its due ſhare of oxygene, is rather diſtinguiſhed by a negation of ſmell; but its properties are otherwiſe felt, by a full and grateful inſpiration, expanſion of the cheſt, exhiliration of ſpirits, alacrity of mind, and vigour of muſcular motion.

Mr. Burd, ſurgeon of the Niger (*vide* MED. NAUT. vol. i. p. 155.) obſerved, that the offenſive ſmell of the gunpowder fumigation between decks was conſtantly changed by the diffuſion of nitrous gas: this is to be accounted for in the ſame manner as was done above, with the effluvia from the neceſſaries in the Union, the nitrous gas decompoſing the carbonic-ſulphurated hydrogenous gas. The oxygene of the nitrous gas combines with the hydrogene, by ſomething like a ſlow combuſtion, to form water; and the ſmall portion of azote, with the ſulphur and carbone ſuſpended in the hydrogenous gas, is precipitated, and with them the ſmell diſappears. Thus it is apparent, and demonſtrated by chemical facts, that the offenſive ſmell which Dr. Smyth's preventive corrects, proceeds from the *very ſubſtance* which Dr. Lind employed, and which is alſo directed to be employed at this moment, in the public inſtructions of Navy Surgeons, for deſtroying contagion throughout the Britiſh navy! And we ſhall ſee by and bye, that the nitrous gas of Dr. Smyth is no other than the *matter of contagion*, *the peſtilential fluid* of a ſtill later writer. Such is the inſtability of medical theory!—*in omne volubilis ævum* *.

The different perfumes which have been introduced into the practice of Phyſic, and employed in the apartments of the ſick, to cover offenſive flavours, we verily believe render the air ſtill more noxious, however grateful they may be to the ſenſe of ſmell; for moſt of them give out hydrogenous gas. They impart no oxygene to the atmoſphere; and if we are to make the olfactory organs the teſts of its purity, we muſt be conſtantly adding freſh quantities of the ingredient, whatever it is, in order to continue the ſame impreſſion on the noſe. The aromatic vinegar of the Edinburgh Diſpenſary, vulgarly the vinegar of the four thieves, is of all perfumes the moſt grateful: it may afford a tranſient ſtimulus to the nerves of ſmell; but its effects on the atmoſphere cannot be great. If vinegar, evaporated by the heat of the atmoſphere, gives out oxygene, as I ſuſpect it does, it had better be employed by itſelf. Subſtances that undergo combuſtion, for the purpoſe of yielding ſtrong ſcents to impregnate the medium we breathe in, are ſtill more pernicious ; for that proceſs conſumes a quantity of vital air : for the ſame reaſons, whenever fires are employed, there ought always to be a free and uninterrupted circulation of external air. It therefore cannot be defended, that the impreſſions communicated by ſtrong ſmelling ſubſtances can have any effect on our ſenſitive ſyſtem, ſo as to make it reſiſt the influence of marſh or human miaſma, diffuſed in the atmoſphere, taken in by inſpiration, and ſpread over the whole bronchia of the lungs.—So much for fumigation and perfumes.

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* Nitrous acid corrects the bad ſmell of water tainted by caſks at ſea from long keeping; but at the ſame time it renders the taſte ſomewhat aciduous. See our experiments in Medical and Chemical Eſſays. Jordan, Fleet-ſtreet, London, 1795.

We have heard of a medical gentleman, a phyſician to a public hoſpital, and of the old ſchool, who has never had the ſmalleſt curioſity to try what has been fulſomely called the *elegant* preventive ; but prefers the ſmoke of tar and pitch to all other ſubſtances. This phyſician, like many others, probably looked no farther than his noſe ; and when he perceived that the ſmell of his tar was ſtronger than the hepatic gas, was ſatisfied that his patients were ſafe and breathing pure air.

The practice which we have found moſt ſucceſsful differs from that of other phyſicians, chiefly in the following points: They have been entirely occupied in deviſing and inſtituting chemical means for deſtroying and ſubduing contagion, without being able to demonſtrate what it is, or how it affects the ſenſorial power: our view has been directed to fortify the human body againſt its action, and by attending to thoſe circumſtances which aſſiſt its operation externally, or by prediſpoſition of conſtitution. We have therefore never loſt ſight of a vital principle; and while we derive due advantage from chemical induction, we are conſtantly aware of its uncertain application to the living animal ſyſtem. Experience may improve and mature our method of prevention, and vary the rules of practice to particular caſes; but the principles on which it is founded muſt continue the ſame. We thus find it to be one of the moſt eſſential pieces of our duty to attend to the ſtate of the mind in the early ſtage of infection, by employing various mental ſtimuli, ſo as ſtrenuouſly to engage the attention of the patient, and by which means the firſt impreſſions of diſeaſe have been frequently overcome, and never renewed afterwards.

The very oppoſite nature of the ſubſtances which have been employed as prophylactics, and the weak grounds on which they have been brought into repute, were ſufficient reaſons for us to watch with jealouſy their effects. When we ſaw them fail everywhere, even in the hands of their ſupporters, it was but fair to allow us a new path to improvement; in exploring which we have already arrived at a conſiderable degree of certainty, and our ſucceſs is to be explained and made intelligible to every capacity, for it diſclaims all theory.

It is ſomewhat ſingular that among all the variety of articles that has attracted the attention and excited the ingenuity of phyſicians, none of them have ever recommended a proceſs for ſupplying ſhips or hoſpital-apartments with *factitious oxygene.* But it is eaſily to be perceived that their wits have been directed, not to the ſupport of the vital flame by chemical agents, of health; but ſolely to the deſtruction of the matter of contagion, by mortiferous vapours. Surely in the preſent improved ſtate of chemiſtry, it might be produced with as much facility, and the ingredients for yielding it purchaſed at as cheap a rate as gunpowder and ſalt-petre. We are told that air, deprived of its purity by reſpiration in crowded places, favors the generation of contagion: then with an equal certainty muſt an increaſed proportion of pure air prevent or correct that generation. But there is a ready objection to all this: if officers are attentive, we think it can never be neceſſary; ſome means can always be deviſed to ventilate the decks. In the apartments of ſick on ſhore, if perfect purity is not to be obtained, infected people had much better be expoſed in the open fields: there is more humanity in expoſing a human being to the external air, than in ſtifling him with peſtilential exhalations within doors.

The ſubject of infection has lately attracted more notice from officers, than was done on former occaſions; they have liſtened with curioſity to the oppoſite arguments of phyſicians, and many of them have patiently read our ſentiments on its propagation and extinction. We have met with ſome who have entered warmly into the diſpute, and have made themſelves ſufficiently acquainted with the chemical doctrines of the day, to decide with impartiality on the merits of the controverſy. Soon after the nitrous gas had received the ſanction of the Commiſſioners of Sick and Wounded to be employed in the navy, ſome ſuſpected caſes appeared in a ſhip at Spithead, not attached to the channel fleet. The ſurgeon informed his captain of his ſuſpicions, and his wiſh to comply with his new inſtructions, in diffuſing the nitrous gas, which, he added, had obtained the firſt character as a prophylactic. The captain had juſt been reading on the ſubject: "Pray Mr. ——," he ſaid, "what do you take contagion to be?" He quoted Dr. Smyth's authority in giving an anſwer; but the inquiſitive officer was not ſatisfied.

"How does nitrous gas act on contagion?"

Dr. Smyth's book was again reſorted to; it was not ſatisfactory. They turned to Mr. Keir's letter, which the doctor adduces in ſupport of the ſalubrity of his gas. This only rendered the buſineſs more obſcure. It was like Mr. Shandy and Uncle Toby's dialogue on parturition. "Dr. Smyth "and the chemiſt ſeem at variance," ſaid the captain; "he ſpeaks of a *vitious fermentation;* "this is a phraſe I do not underſtand."

"Nor I," ſaid the ſurgeon; "but to explain "it their way, I apprehend there is a neceſſity "for terms that chemiſtry does not at preſent "employ."

They walked along the decks, they were clean and dry; the people clean and well clothed: a maintopmaſt ſtunſail nicely balanced and trimmed, as I have ſeen it in the Royal Sovereign and other well-regulated ſhips, with wind-ſails at the fore and after-hatchway, had made the air as pure as above. They both agreed that no nitrous gas could be wanting there. They viſited the ſick berth: "This indeed is offenſive," ſaid the commander, "and you had better try your fumigation." The ſurgeon ordered the ſand to be heated, and the fumes aſcended from the pipkins. About an hour, and the air had no ſmell. In a ſhort time the offenſive flavour returned; the fumigation was renewed, and it again diſappeared; but the ſick rather complained of coughing, and one of them vomited. In an hour the effluvia became as diſagreeable as at firſt: ſome foul utenſils were now diſcovered in a corner; they ſeemed to taint the air, and were ordered away to be cleaned. The offenſive vapour never more returned. "Now," ſaid the diſcerning officer and ſurgeon, "this deſcription anſwers exactly to the "account given of the Union hoſpital-ſhip; but "inſtead of calling in the aſſiſtance of nitrous gas "from a London phyſician to deſtroy this foul "air, it will be a more healthy practice to prevent its production, which we can do *gratis*, by "the pure winds of heaven."—"Thus," added the captain, "I can ſee how inſtitutions of this "ſort may do harm; this gas, as it overcomes "naſtineſs of ſmell, may happen, in indolent "hands, to ſuperſede the uſe of ſoap and water, "and we ſhall be overwhelmed with filth." The explanation of contagion ſtopped here; and as to the explanation of correcting the offenſive matter, we have already given that. We thus ſee to what embarraſſments people muſt be expoſed, who attempt to defend a practice of phyſic that reſts on no appeal to firſt principles, and unſupported by unequivocal teſtimony of its ſucceſs *.

An implicit confidence in the authority of phyſicians, and paſſive obedience to their directions, have certainly, on nameleſs occaſions, prolonged infection in his Majeſty's ſhips; for the proceſs of fumigation, till lately, had engroſſed the whole attention. We need only reſort to Dr. Lind's works, for the full confirmation of this truth. The unreflecting part of mankind, in all ages, have been prone to admire what they could not comprehend; and from a love of the marvellous, whatever has been delivered in a myſterious manner, has been followed by the credulous multitude, while they have rejected every thing that is obvious to the ſenſes. The whole preventive means hitherto, it therefore is evident, have depended on ſpeculative doctrines about the nature of contagion: and from having no fixed principles to go upon, they have varied and fluctuated like all human opinions. It will always be our wiſh to confine this duty as much as poſſible to the hands of officers: it muſt be familiariſed to them; ſyſtematically interwoven with habits of diſcipline, and to be enforced by their authority, if ever it is to attain that perfection that it is capable of.

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* Oxygenated muriatic-acid gas alſo deſtroys the offenſive ſmell ariſing from privies, or the matter of ſloughing ulcers, by decompoſing the ſulphurated, carbonated, phoſphorated hydrogene.

Since our laſt publication, as we obſerve our rules to be more punctually followed, we alſo meet with increaſed ſucceſs in proportion. There have been but few ſhips infected during the laſt two years; but they have not been ſo, without beſtowing us leſſons of advice. We ſhall detail the whole, beginning with thoſe where our rules were not adhered to.

In March 1797, La Nymphe frigate received the infection from ſome French priſoners, which appeared firſt in two men that had come from a prize. The worſt caſes were ſent to Plymouth Hoſpital, but others were kept on board and recovered. The ſurgeon had juſt received the new code of inſtructions from the Board of Sick and Wounded, and began the nitrous fumigation as there directed; but it was not ſtrictly perſevered in. In April the ſhip came to Spithead, having buried one man in the paſſage. The fever continued to ſpread; and before the 18th of May, eighty patients were ſent to hoſpitals. Mr. Outram left her about this time; and it appears from the report of his ſucceſſor, who joined La Nymphe in July, that the infection was not ſubdued at that time, or entirely extinguiſhed till September.

Mr. Gray ſays, "I cannot account for the in-
" troduction of the fever, as it made its appear-
" ance previous to my joining the ſhip: but from
" the information which I have been able to col-
" lect, I am led to think ſhe had never been clear
" ſince it was brought on board by French pri-
" ſoners in March. It was not malignant in my
" time, and ſeveral were but ſlightly affected.
" We had the ſatisfaction to ſee it completely
" ſubdued before our return to port. The means
" uſed for this purpoſe were their immediate ſepa-
" ration, allowing them no kind of communica-
" tion whatever with the reſt of the people. Their
" clothes were taken from them, aired and waſhed,
" and not returned till their recovery. Fires
" were carried daily betwixt decks, and conſtant
" ventilation with windſails attended to. Fumi-
" gations with the nitrous acid were alſo uſed:
" but whether they were more effectual in de-
" ſtroying the contagion than the other methods,
" I have not obſerved *.

" The ſymptoms of this fever were, cold ſhi-
" vering alternated by heat; head-ach; pains of

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* Is it not equally probable that the nitrous fumigation prolonged this infection? There is as much reaſon for that ſuppoſition as the other.

" the back, knees, ſhoulders, and breaſt; ſickneſs
" at ſtomach; pulſe weak and frequent; tongue
" foul; thirſt; loſs of appetite; dejection of ſpirits,
" and great debility. I treated it by emetics in
" the commencement; a ſudorific, compoſed of an
" opiate and antimonial, at bed-time; antimonials,
" wine, opium, and cinchona. October 4th,
" 1797." I do not quote this prolonged infection as an inſtance of the inefficacy of the nitrous gas: but if confidence in the new proceſs attracted the attention of either the ſurgeon or officer, from the careful and immediate ſeparation on the firſt appearance of fever, it is to be regretted much. We have no heſitation in ſaying, that this contagion ought to have been extirpated in a fortnight, had our rules been ſtrictly complied with. The anarchy which prevailed in this ſhip about the beginning of May was alſo another cauſe of this fever being protracted.

In June 1798, the variolus contagion appeared in the Captain of 74 guns, with the fleet off Uſhant, and of the confluent kind. The firſt caſe was detected in due time, but Captain Aylmer had no means of getting quit of the man. As the puſtles arrived beyond maturity, the effluvium from the diſeaſed people became exceedingly offenſive. The nitrous gas was diffuſed occaſionally to correct this ſmell, which it always effected; but the infection was progreſſive; the diſeaſe continued in the ſhip for ten weeks, and was cleared at laſt by going to port. Fifteen people had the ſmall-pox during the cruize, of whom ſeven died. (*Vide* SMALL-POX.) It is eaſy to underſtand what this offenſive ſmell was: but would it not be better to prevent its accumulation by perfect ventilation?

The contagion of La Nymphe was carried to the Defiance by a boat's crew, who were obliged to remain in the frigate a whole night, in a gale of wind. It firſt appeared in the boat's crew, and afterwards ſpread to others. But its preſence being quickly detected by the vigilance of Mr. Glegg, it ſoon engaged the attention of Captain Jones and his officers, and was overcome in due time by means which muſt always be effectual in well-ordered ſhips, without the quackery of fumigation.

A ſimilar fever appeared in La Pique in the ſummer of 1797, and was imported by raw landmen from the receiving-ſhip. It was early diſcovered among theſe men by Mr. M'Donald, and never affected any others of the ſhip's company. It ſoon diſappeared; the means which the ſurgeon recommended being well inforced by the accurate diſcipline of Captain Milne and his officers. (*Vide* Mr. M'Donald's Report in the General Abſtract.)

The London alſo, at this time, had ten caſes of typhus, derived from the ſame ſource, and entirely confined to raw landmen. They ſoon recovered in a cleanly and well ventilated ſick berth, under Mr. Smith's care.

We conſider it a fortunate circumſtance for naval ſervice, that we always meet the moſt cordial ſupport from Officers in this important duty; and we think it no leſs fortunate, that in theſe recent inſtances of ſucceſsful extirpation, no fumigation was uſed, that might hereafter bias the practice. But do not theſe freſh facts, ſo obvious and ſimple, aſſure every unprejudiced obſerver, who is open to conviction, that ſuch means, zealouſly employed, muſt always be effectual. And on the other hand, do not theſe plain facts alſo juſtify the concluſion, that contagion had *never* yielded to fumigation? that the proceſs is not only ſuperfluous, becauſe ineffectual, but that it is pernicious, by loading the atmoſphere with unreſpirable gaſes, and thereby diminiſhing that portion on which life depends. When, therefore, fevers have continued to ſpread for many weeks, during the employment of ſuch fumes, is it not fair to affirm that theſe increaſed the rage of infection, becauſe ſulphureous gas, nitrous gas, &c. are deſtructive to animal life? and being uſed in diffuſed and ſmaller quantities, are only poiſons in a more diffuſed and ſmaller form. And all phyſicians have agreed, that there is a condition of the living body which ſingularly favours the progreſs of typhus fever, and which they have called *prediſpoſition;* and that this condition is particularly induced and increaſed by breathing air not ſufficiently pure; which impurity, in this inſtance, muſt always obtain wherever theſe fumigations are diffuſed in a breathing medium.

We have been called upon to give our opinion, in what manner contagion affects the human body: Is it to be conſidered as a ſtimulant, exhauſting the ſenſorial power, and producing indirect debility? This ſubject has been haſtily diſpoſed of elſewhere: we have ſtill many doubts; but our reflections are not ſufficiently matured to decide. The matter of contagion, whatever it may be; it may be nitrous gas, or any other gas; certain it is, that it affects the human body by firſt impregnating the atmoſphere. All theſe gaſes, we readily admit, may be called ſtimulants, if taken into the ſtomach, or applied to an excoriated ſurface; but as diffuſed in the medium which animals breathe, they render it leſs fit for reſpiration. The elective attraction of the lungs giving out and receiving noxious and ſalutary principles, by expiration and inſpiration, is deſtroyed by the preſence of the contagious miaſmata; and the firſt ſymptoms of infection would appear to be the imperfect expanſion of the lungs, abſtraction of heat and oxygene, with a correſponding ſenſation throughout the whole frame. We ſee no reaſon, however, that excludes the ſuppoſition of the hurtful quality being *firſt* applied to the nerves ſpread on the delicate membranes of the bronchia, and *from them* communicated to the ſyſtem. Is it inconſiſtent with the wiſe proviſions of defence which Nature has given to other organs, to ſay that the nerves expanded on the pulmonary veſicles are endowed with a perceptive diſpoſition, that enables them to diſtinguiſh the hurtful qualities of the air, abſtracted from all chemical combination, which reſpiration may effect on the vital fluid? Is it too groſs to ſay that they feel? that they poſſeſs an animal appetency for the expreſs purpoſe? Their ſenſe we know to be moſt exquiſite, from the leaſt irritation throwing the trachia and bronchia into convulſive action. And theſe nerves muſt be admirably ſuited for that intention; as the blood, warmed and ſtimulated by every freſh acceſſion of oxygene, muſt be conſtantly beſtowing excitement. Surely it is reaſonable to admit from analogy, that the lungs, ſo wonderfully conſtructed, may diſtinguiſh a poiſonous quality in the air through the medium of nerves, as well as the optic nerves ſhould diſcern light. Sulphurous and nitrous gas excite coughing: an excoriated or wounded part feels an increaſe of pain, when held in a veſſel containing oxygene gas: with equal propriety, therefore, it may be ſaid that the pulmonary nerves become diſeaſed by the application of contagious matter, and that the lungs in conſequence ceaſe to perform aright their chemical functions. I am led into theſe reflections by being perſuaded, that this ſubject has been conſidered too much in a chemical view; and the preſence of a vital principle operating in the ſyſtem, made but of ſecondary conſequence in this ſublime operation of Nature. Whether this opinion will be admitted or not, our doubts are not yet removed, that the effect of contagion is the abſtraction of ſtimulus from the body, and the ſucceeding typhus a diſeaſe of direct debility.

We can hardly ſuppoſe that contagious matter acts as a ſtimulant producing indirect debility, when we ſee its action ſo manifeſtly aſſiſted by prediſpoſition, and that depending generally on a debilitated ſtate of body. Its previous ſtimulant power has never been marked; and the very ſlow progreſs of the early ſymptoms ſometimes are a ſtrong argument againſt its exiſtence. But if it induces fever, by directly affecting the organs of reſpiration, by deficient ſtimulus to *their nerves*, or by imparting *leſs oxygene* to the blood, the whole operation may be accounted for without admitting its ſtimulant power. The diſeaſed condition of the ſtomach, we think, is always a ſecondary as an attendant on the febrile ſtate: the contrary opinion aroſe chiefly from the notion, that the poiſon was received by the mouth, afterwards taken into the circulation, and there became the cauſe of the fever. This could never be the caſe in thoſe inſtances where contagion in a moment, quicker than thought, induces wild delirium, and ſometimes inſtant death. As acting immediately on the organs of reſpiration, the fact is explained; and alſo leaves us ſtrongly impreſſed, that the nervous ſyſtem is primarily affected.

We alſo conſider the beſt prophylactics to be whatever gives a moderate degree of excitement to both body and mind; ſuch as temperance in eating, wine or fermented liquors in due quantities, amuſements, regular hours of ſleeping and waking, moderate venery, &c. If, however, we ſhould wiſh to prevent typhus, when expoſed to the infection, if of a ſtimulant nature, bleeding, purging, and low diet, would be the beſt ſecurity. Theſe are the moſt certain preventives, in warm climates, in European conſtitutions; but we judge them to be rather unſafe in our latitudes, and in our low fevers.

The whole phænomena of fever may therefore be reſolved as a ſeries of ſympathetic affections, from impreſſions made by a noxious power on our ſenſitive ſyſtem: that the duration of theſe impreſſions, as overcoming the natural habits, conſtitutes the diſeaſe; and the removal, the recovery of health with all its aſſociated actions.

While this ſubject was engaging the attention of different phyſicians in England, and while the nitrous gas of Dr. Smyth had been honoured with the patronage of the Commiſſioners of Sick and Wounded, and directed by their official authority to be employed for deſtroying contagion throughout the Britiſh navy, a very different doctrine has been promulgated on the Continent of North America by Profeſſor Mitchill, of Columbia College. It is no other than a direct aſſertion, that nitrous gas, the ſeptic gas of the author, is a *peſtilential fluid*, and the matter of contagion itſelf. Such an oppoſition of opinion as this, in an age renowned for the penetrating ſpirit of inquiry, and at a time when chemical philoſophy had attained ſuch perfection, is one of the moſt humiliating leſſons to the pride of human knowledge that has ever been taught in the ſchool of ſcience. If the theory of Dr. Mitchill is to be ultimately eſtabliſhed, how mortifying the reflection, that the fleets of Britain have been freighted with a peſtilential vapour, and that, like the companions of Ulyſſes, our ſeamen were liable to periſh by winds which they carried in bags along with them!

This doctrine, which has been publiſhed in America, and delivered for ſome years in the Profeſſor's Lectures, was firſt printed in England, in Beddoes' fifth and laſt parts of "Conſiderations "on factitious Airs;" Johnſon, London. After the example of the Medical School of Edinburgh, the Students of Columbia College have taken the ſubjects of their inaugural diſſertations from the lectures of the Profeſſors; and the Mitchillian theory of contagion and fever has been defended in ſome of theſe, by ingenuity and abilities that have not a little contributed to give it ſtability, and to render it popular. A Theſis on the natural and medical Hiſtory of Septon (azote), by Dr. Saltonſtall, is reviewed in the Appendix to the twentieth volume of the Monthly Review, for Auguſt 1796. This fell into my hands while compiling my chapter on Contagion, and is mentioned in a note, vol. i. p. 246 of MEDICINA NAUTICA; which was all that we knew of the doctrine at that time.

After peruſing our work, Profeſſor Mitchill has been ſo kind as to favour me with a number of papers on *Septon*, which contain a continuation of his doctrine, in various communications to his friends; and alſo ſome inaugural diſſertations of his pupils, who have diſtinguiſhed themſelves in ſupport of the theory. They may therefore be conſidered as a ſequel to the eſſay publiſhed by Dr. Beddoes. Theſe communications have been honoured by the particular attention of Sir John Temple, Bart. and tranſmitted by him to Mr. Nepean, Secretary to the Board of Admiralty, for our peruſal. We have no doubt but they will be highly acceptable to the Engliſh reader, and particularly valuable, at this time, to the Surgeons of the Navy and Army.

While Britain mourns with widows and with orphans, and the flower of her navy and army is daily falling a victim to an irremediable contagion, every well-meant endeavour to leſſen mortality, and throw light upon the ſubject, deſerves the gratitude of mankind, and muſt be eagerly ſought after by the profeſſional gentleman. We have lately read with horror the ravages which the yellow fever continues to make at Philadelphia and New York. There ſeems indeed a ſtated return of the peſtilence, that revolves with the ſeaſon; and Auguſt, September, and October, are the devoted months, when the human race muſt be deſolated by its ſcourge. It is now generally agreed among phyſicians in America, and we ourſelves always thought ſo, that this dreadful epidemic is generated in their own neighbourhood, and the baleful offſpring of their ſwamps and marſhy ſavannas. The idea of its being imported is therefore no longer ſupported; and arguments drawn from coffee rotting on the wharfs, or infection brought from Boulam, have all given way to the certainty of its North American origin. The Americans muſt therefore look at home for its prevention, and, by changing the ſurface of the ſoil, deſtroy the laboratory of the poiſonous exhalation.

There is one queſtion, however, to be aſked at this place. If the fever is indigenous in North America, how comes it to have appeared ſo ſeldom in that country before? Has any great change of modes of living taken place in the United States, that has made the inhabitants barter the health of the ſimple planter for the peſtilential diſeaſes of the town and city manufacturer and merchant? I am apt to believe there is ſomething of this kind, though not taken into the account by their medical writers. Engliſh tables will produce Engliſh diſeaſes in America, as well as in the Weſt-India Iſlands; and the changes which the excitability of the ſyſtem muſt undergo, between the ſevere cold of their winters and the extreme heat of their ſummers, exactly correſponds with the fact, and explains the prediſpoſition to a fever, highly inflammatory on its acceſſion, rapid in its progreſs, and thus from its genius ſuddenly fatal in the iſſue. If this be the caſe, and you wiſh to live healthy, ye wiſe Americans! forego the luxury of European banquets, and return to your primitive ſimplicity of living.

Independent of the riſing celebrity of the learned author, ſome local circumſtances have occurred in New York, which have given to thoſe opinions a degree of credit little ſhort of demonſtration. It appears that the legiſlature had enacted ſevere laws againſt the manufacturers of ſoap and candles, under the idea of the ſmell being unpleaſant it muſt alſo pollute the atmoſphere, and aſſiſt the propagation of the reigning peſtilence. The benevolent profeſſor became their advocate, convinced the government of a miſtaken policy, and the obnoxious ſtatutes were repealed; for upon mature inveſtigation, it was proved by the moſt clear and ſatisfactory teſtimony, that the neighbourhood, and the citizens employed in theſe greaſy occupations, remained healthy and exempted from the fever, while death and deſolation were following its footſteps in all other directions. The explanation of a fact ſo ſtriking could not eſcape the active mind of the enlightened Mitchill. The ſeptic gas (nitrous gas) having a ſtrong attraction for all inflammable ſubſtances, rapidly decompoſes the fat of the ſoap and tallow, and is itſelf decompoſed; it alſo, by attraction, converts the alkaline ley into nitre, and thus covers its peſtilential qualities.

Theſe communications were accompanied by the following letter from Dr. Mitchill, in which I gladly recogniſed the name of an old acquaintance, and fellow-ſtudent at Edinburgh.

"SIR, New York, May 26th, 1798.

"I ſee in your MEDICINA NAUTICA, under the article "Contagion," an intereſting diſcuſſion concerning the efficacy of nitrous gas, or ſmoking nitrous acid vapour, in deſtroying infectious or peſtilential matter in ſhips. This practice, which has been ſo loudly extolled, appears to me to be one of the moſt prepoſterous and ill-contrived that could ever enter the head of man. The reaſon of it, however, as you obſerved, is evident; it is a relict of the old *animalcular hypotheſis*, and is partly ſupported by the faſhionable opinion that *alkaleſcency* peculiarly characteriſes putrefactive proceſſes, and therefore muſt be overcome by ſome ſubtil and penetrating acid.

"As I found you engaged in earneſt in combating a practice which I think wrong in principle, and as, on that point, your ſentiments nearly correſpond with my own, I reſolved to write to you by the firſt opportunity on the ſubject. I was the more emboldened to do this, as I ſaw you had in a note referred to ſome opinions of mine, which were almoſt diametrically oppoſite to thoſe of Dr. J. C. Smyth, and which you had become acquainted with only through the medium of the Monthly Review: there was too another reaſon for ſending you my ſentiments relative to peſtilential air; for, if I miſtake not, you and myſelf were cotemporaries in Edinburgh, and have paſſed many evenings together in the ſocieties there; though, as I was very young, I queſtion if you recollect me. I ſerved in the Medical Society one ſeaſon as Curator of the *Experimental Committee*, and as a member of the *Purchaſing Committee for the Library*.

" On leaving Europe I returned to New York, the place of my nativity, where I have ſince reſided. The city of New York contains about ſixty thouſand inhabitants. It has a well-endowed, large, and much-frequented hoſpital, and I am one of the four phyſicians who have charge of the medical department of it. In the city is a very reſpectable college, and I hold the profeſſorſhip of chemiſtry, natural hiſtory, and agriculture. And I alſo am one of the members of the ſtate-legiſlature for the city of New York.

" You, doubtleſs, have heard of our viſitations, in the cities along the American coaſts, by a diſtemper called Yellow-fever. Our city has been afflicted by it more than once. My opportunities of ſeeing and obſerving have, as you may readily ſuppoſe, been pretty frequent and extenſive. After much time and labour beſtowed on the ſubject, I have attempted to generaliſe the facts, and reduce them to ſo much of ſyſtem, as to make out a " Theory of Peſtilential Fluids," including both the aërial and liquid forms, of infectious matter.

" Owing to the preſſure of heavy calamity upon us, our attention has been turned with more than ordinary keenneſs to detect the cauſe of our diſtreſs. Peſtilence has been diſcuſſed, in our college, our hoſpital, in our municipality, and in our legiſlature. We ſeem pretty generally ſatisfied here, that ſome combination of *ſepton with oxygene* produces the genuine form of peſtilential fluids; and conſequently, *alkaline ſubſtances*, *oily bodies*, *water*, &c. (for ſeptic acid will unite with all theſe), are the remedies, preventives, and antidotes. *Acid fumigations are laughed at here.* We wonder how men of ſenſe and ſcience can recommend or even endure ſuch practices. I ſhall own myſelf miſtaken if the boaſted ſpecific for ſyphilis, *i. e.* nitric acid, does not turn out in like manner to be an inſtance of deception to the publiſhers of caſes, and to the public. Both proceed on the ſame hypotheſis; both muſt ſtand or fall together.

"My doctrine, I deliver in my lectures, and the Diſſertations I ſend you, by Drs. Saltonſtall, Bay, and Lent, will evince to you the effect produced on the minds of our ſtudents. Beſides theſe, I wiſh you to attend very particularly to the *caſe of the tallow-chandlers and ſoap-makers*, bound up in the volume. It was intended to turn theſe tradeſmen out of the city for generating peſtilential air. They took counſel, and remonſtrated againſt ſuch violent proceedings. The arguments, affidavits, and notes, were drawn up and employed to procure a repeal of the law: and I have the ſatisfaction to inform you, that truth has triumphed, the legiſlature and the public are ſatisfied, and the oppreſſive ſtatutes are repealed and done away. The argument was drawn up in as *popular* a ſtyle as poſſible; it therefore contains few technical terms, and it has fully anſwered the purpoſe for which it was intended. Subjects of this ſort ſeldom become matters of ſuch rigid inquiry and ſober public examination as this has done here.

" With many wiſhes for your perſonal happineſs, and for the ſucceſs of our enquiries, believe me to be yours ſincerely,

" Sam. L. Michill."

" To Dr. Trotter, &c."

While Profeſſor Mitchill was thus employed in giving to mankind a new doctrine of contagion, founded on the fine diſcoveries of pneumatic chemiſtry, a third quarter of the globe was becoming alſo a field for improvement and obſervation, and has produced a method of prevention and cure, fundamentally the ſame with that of the American phyſician. The following account is taken from a periodical publication, for I am ignorant if any other is before the public.

THE PLAGUE.

Niſi utile eſt quod facimus, ſtulta eſt gloria.
(A. R. Sc. Liſb.)

" The following ſhort directions for the prevention and cure of the plague are compiled from a ſmall pamphlet in the Italian language, publiſhed by Count Berchtold at Vienna in 1797, one copy of which is in the poſſeſſion of the Royal Academy of Sciences at Liſbon, to whom it was preſented by his excellency Mr. Pinto, her Majeſty's ſecretary of ſtate, &c.

"The academy has ordered tranſlations to be made into Arabic, French, and Portugueſe; and this extract in Engliſh is particularly intended for the uſe of the numerous bodies of Britiſh ſubjects at preſent employed in their country's ſervice in this part of Europe; as the garriſon of Gibraltar, the fleet at ſea, the troops on ſhore in Portugal, and the maſters of Britiſh veſſels in its harbours.

"The compiler has no other information whatever concerning it, than that contained in the pamphlet, nor does he know if any thing upon the ſubject has yet been publiſhed in England. He leaves the reader to believe or reject according to his judgment, heartily wiſhing there may never be a neceſſity for putting it to the trial.

"Count Berchtold ſays, that the method was firſt propoſed by G. Baldwin, Eſq. his Britannic Majeſty's agent and conſul-general at Alexandria in Egypt, who, during a long reſidence in that country, after much thought and obſervation, was induced to believe that the uſe of ſweet oil applied to the ſkin, might prove beneficial in the treatment of this dreadful and hitherto incurable malady.

"Mr. Baldwin communicated his ideas to the Rev. Lewis de Pavia, chaplain and agent to the hoſpital called St. Anthony's at Smyrna, who, after five years experience, pronounces it to be the moſt efficacious remedy hitherto made uſe of, for the ſpace of twenty-ſeven years that the hoſpital had been under his management. He acquainted Count Berchtold with the ſucceſs and the mode of application, and from his communications the pamphlet ſeems principally to have been compoſed.

" Count Berchtold further ſays, that it is Mr. Baldwin's intention to publiſh a more full and philoſophical relation of his obſervations and experiments; that he favoured the Count with a peruſal of his manuſcript, and permitted him to tranſcribe any part of it; and he apologiſes to the world and to Mr. Baldwin for this ſeeming anticipation of the work: at the ſame time obſerving, that he feels a ſacred and indiſpenſable duty to loſe no time in making known a diſcovery of ſuch importance, particularly to thoſe countries that are nearer, and have more frequent commerce with the Barbary ſtates and ports of the Turkiſh empire.

" The directions are ſimply theſe: immediately that a perſon is perceived to be infected with the plague, he muſt be taken into a cloſe room, and over a brazier of hot coals, with a clean ſpunge dipped in warm olive oil, his body muſt be briſkly rubbed all over, for the purpoſe of producing a profuſe ſweat. During the friction, ſugar and juniper-berries muſt be burnt in the fire, which raiſe a denſe hot ſmoke that contributes to the effect.

" The friction ought not to continue more than four minutes, and a pint of oil is enough to be uſed at one time.

" In general, the firſt rubbing is followed by a very copious perſpiration; but ſhould it fail of this effect, the operation may be repeated, firſt wiping the body with a warm dry cloth; and in order ſtill further to promote perſpiration, the patient may take any warm ſudorific drink, ſuch as elder-flower tea, &c.

" It is not neceſſary to touch the eyes; and and other more tender parts of the body may be rubbed more gently.

" Every poſſible precaution muſt be made uſe of to prevent the patient from taking cold, ſuch as keeping covered thoſe parts of the body not directly under the operation; nor muſt the linen be changed till they perſpiration has entirely ſubſided.

" The operation ſhould be repeated once a day, until evident ſymptoms of recovery begin to appear.

" If there are already tumours upon the body, they ſhould be gently and more frequently rubbed, till they appear to be in a ſtate of ſuppuration, when they may be dreſſed with the uſual plaſters.

" The operation ought to be begun on the appearance of the firſt ſymptoms of the diſeaſe; if neglected till the nerves and the maſs of blood are affected, or a diarrhœa has commenced, little hopes can be entertained of cure: but ſtill the patient ſhould not be deſpaired of, as by an aſſiduous application of the means propoſed, ſome few have been recovered, even after the diarrhœa had commenced.

"During the firſt four or five days, the patient muſt obſerve a very abſtemious diet: the author allows only a ſmall quantity of vermicelli ſimply boiled in water. Nor muſt any thing be taken for the ſpace of thirty or forty days, except very light food; as he ſays an indigeſtion, in any ſtage of the diſorder, might be extremely dangerous. He does not allow the uſe of wine till the expiration of forty days.

"There is no inſtance of the perſon rubbing the patient having taken the infection. He ſhould previouſly anoint himſelf all over with oil, and muſt avoid receiving the breath of the infected perſon into his own mouth or noſtrils. The *prevention* to be uſed in all circumſtances is that of carefully anointing the body, and living upon light and eaſily digeſtible food.

"One of the many ingenious obſervations made by Mr. Baldwin is, that amongſt upwards of a million of inhabitants, carried off by the Plague in Upper and Lower Egypt during the ſpace of forty years, he could not diſcover a ſingle oilman or dealer in oil.

"*Liſbon*, 1797. By Royal Permiſſion."

The practical precepts contained in this ſimple narrative exactly correſpond with thoſe of Dr. Mitchill, although we can obſerve, that here and there they lean to a pathology that is now forgotten. The diet and regimen are alſo ſimilar, and are very judiciouſly choſen, no doubt, by the beſt of all guides, Experience. The Medical Board of the Navy and Army muſt of courſe have publiſhed this method of prevention and cure; and we ſhall anxiouſly wait an account of the reſult of its trial in the yellow fever of the Weſt Indies among the ſeamen and ſoldiers.

The American diſſertations afford us moſt favourable ſpecimens of the progreſs of medicine on the other ſide the Atlantic. They bring to our remembrance our paſt ſtudies, thoſe *halcyon days*, when the ardent purſuits of the young inquirer were ſo earneſtly patroniſed and cheriſhed by the example and countenance of the never to be forgotten Dr. Cullen. To us they are particularly ſatisfactory, as they ſeem to realiſe ſome of thoſe predictions which we made in our ſecond edition of "Obſervations on Scurvy," which was one of the firſt attempts to explain pathology from pneumatic chemiſtry. But they will be doubly valuable by extending the field for diſcuſſion, and inviting the learned to take ſhare in the inquiry; and by enlarging the reſources of the medical profeſſion, they will contribute to check the breath of peſtilence, and alleviate one of the moſt ſerious afflictions that has ever ſcourged any nation or country.—(*Vide* APPENDIX.)

MEDICINA NAUTICA.

THE YELLOW FEVER.

SINCE the publication of our former volume, many opportunities have offered for my converſing with officers and ſurgeons on this fever, as it appeared in ſhips and on ſhore. I have alſo peruſed journals and remarks by different medical gentlemen; but alas! they hold out nothing conſolatory; the whole is a catalogue of mortality. Some phyſicians have lately written on the ſubject; the hiſtory of the diſeaſe and its attending circumſtances have been accurately marked and detailed; but we have yet to deplore the imbecility of our art in checking the ravages of this Herculean malady. If the public papers ſhock us leſs than formerly, by accounts of fewer deaths, it does not proceed from a more ſucceſsful method of cure having been diſcovered, but from a ſmaller number of unſeaſoned Europeans being now employed in the ſervice of the country among theſe unwholeſome regions. To ſuch a field for remark we return with increaſed regret; again we weep over the grave of friendſhip, the untimely fate of the companions of our youth, our aſſociates in ſervice and the perils of a ſea life, all that was amiable in the acquaintance, or noble-minded in the officer!

> —— and all quality,
> Pride, pomp, and circumſtance of glorious war!

On reviewing the practice of different medical gentlemen in the yellow fever, we are led to think that the treatment recommended by Dr. Moſeley has been incautiouſly reſigned or laid aſide, for the unaccountable exhibition of immenſe doſes of mercurial preparations. That phyſician has certainly given by far the beſt hiſtory of the endemic cauſus of the Weſt-Indies. He had been twelve years in the iſlands before he wrote, and had not conceived his opinions on haſty concluſions drawn from the fevers of a few patients, or any particular ſeaſon; but by nice obſervation had marked the genius of the diſtemper, which, in his narration, is very ſimple. We earneſtly wiſh to ſee the work of Dr. Moſeley in the hands of every navy ſurgeon going to the Weſt-Indies; and till his practice has been tried in a manner different from what has yet been, we cannot be ſatisfied but much may ſtill be done in the cure of yellow fever. This writer has duly appreciated that careful attention to diſcriminate the various changes which on a ſudden take place in the rapid progreſs of the diſeaſe. In this it would appear all the art lies; for if bleeding and purging are not uſed during the early ſtage, or at the commencement, their effects may be to add to the diſeaſe. Yet the exhibition of calomel in thouſands of caſes, was often perſiſted in to the laſt: this muſt have been done very frequently on moſt unjuſtifiable ground; for the diſeaſe at different periods muſt require a different treatment; and ſuch errors muſt occur wherever a nice diſcrimination of ſymptoms is ſuperſeded by rules not ſufficiently eſtabliſhed on the baſis of due experience.

The following letter of Mr. Edward Laing gives a melancholy account of the fate of our countrymen in the army under Sir Ralph Abercrombie. Mr. Laing was ſurgeon of the 57th regiment.

"DEAR SIR, Carriacou, 28th Dec. 1796.

"You have no doubt heard, long ere this, of the dreadful mortality among the troops in Grenada, as well as in ſome of the other iſlands, particularly St. Lucie and St. Domingo.

"Soon after the reduction of St. Lucie, the 57th regiment was ordered down to Grenada, where they have remained. Until lately we had the credit of being the healthieſt regiment in Sir Ralph Abercrombie's army, but we are now ſuffering as much as the others. In the beginning of July we were completed by draughts to 1130 men; we have not now 500 remaining; and out of theſe not above 180 fit for duty!! I think the other regiments have ſtill ſuffered more than we have.

"We have loſt a ſecond ſurgeon, two mates, and I fear a third will ſoon follow. About ſix weeks ago I was attacked with fever, which left me in ſo weak a ſtate, that I was obliged to come to this iſland for change of air: I expect to return to Grenada in ten days.

"The fever, which firſt made its appearance among the 27th in St. George's, was very rapid in its progreſs, frequently proving fatal in three days, and was generally called by the medical gentlemen of the iſland *Boulam*. But I doubt much its origin being African; I muſt confeſs, however, that I am not at this time prepared to combat their opinion, nor to give one of my own that could be well ſupported; but ſtrongly ſuſpect, that the cauſe depended more upon the *unaſſimilated European conſtitution*, than upon infection, though I do not deny this laſt a ſhare in ſpreading the diſeaſe, particularly after the hoſpitals were crowded. The ſymptoms of the diſeaſe are well deſcribed by Chiſholm; but I am ſorry to ſay his treatment did not anſwer the ſanguine expectations formed of it; nor can I find that his great ſucceſs was known, even in Grenada, till after his publication came out. I have often found calomel uſeful; but it is only when viſceral obſtruction is preſent. After all, I ſuſpect that we ſhall find our account in attending more to *prevention*, by gradually bringing the groſs European habit down to the Weſt-India ſtandard, and in this way obviate the violent inflammatory ſymptoms, with which I apprehend this fever firſt attacks. Inſtead of ſtrenthening the body, as is commonly done by tonics and ſtimulants, to reſiſt diſeaſe, we muſt in ſuch habits purſue the oppoſite plan, and depend upon evacuations and temperance.

" I made an attempt on the paſſage from England, with the men of our regiment, to take off the inflammatory diſpoſition. On firſt coming into the warm latitudes I had a general order given, that they ſhould take the medicines, which were ſmall doſes of calomel, at night, and ſea-water in the morning, repeated twice a week: and although we have lately loſt ſo many men, I ſtill think it was of great uſe. We were healthy at Barbadoes, we continued ſo at St. Lucie, and likewiſe while they were in the woods in Grenada: but ſince they were in quarters where rum was to be got, we have been as ſickly as any other regiment. I have by me many ſtrong proofs that rum has been the principal cauſe of all our misfortunes.

" The fever which prevails now is not ſo violent in its ſymptoms as that called Boulam: it is more of the remitting kind, generally putting on the quotidian or double tertian type, but even in theſe forms proves fatal; the remiſſion being ſo ſhort, the patient cannot bear a ſufficient quantity of bark to prevent the return of fever. I have of late ventured on the uſe of arſenic, and in ſeveral caſes with ſucceſs, where the bark had failed, from not being retained. Where this fever continues long, it generally ends in obſtructions of the liver and other viſcera. Believe me to be, dear Sir, yours, very ſincerely,

" EDW. LAING.

" To Dr. TROTTER, &c."

This conciſe narrative of Mr. Laing entirely correſponds with our former animadverſions on this ſubject. It is certainly by attending more to preventive means, that advantage is to be gained; and it is our opinion that this has not been the caſe hitherto. We have indeed ſeen ſome trifling papers handed among the private ſoldiers going to warm countries, called "Rules for preſerving Health," compiled, I have no doubt, with the beſt intentions, but not delivered to the people as they might have been; and I believe were ſeldom regarded by thoſe whom they moſt concerned. The changes that are to be brought about in the habit of body, for ſecuring health in theſe climates, is not to be done by temperance only; it is to be done by abſtemiouſneſs, as to animal food and fermented or ſpirituous liquors. Yet there are ſome who pretend to argue that theſe are not the means. We hear the eſcape of one drunkard and one glutton cried up, who here and there have continued free from diſeaſe; while thouſands have fallen that never thought of ſubtracting a ſingle drop from their cup, or reducing their allowance of beef or mutton. There is enough known of the nature of the Yellow Fever to carry our rules of prevention to much certainty, and they ought to be more rigidly enforced.

From Mr. Laing I hoped for much valuable information on the Weſt-India climate and diſeaſes; but, alas! I was ſoon diſappointed. This worthy young man, in the bloom of youth, died at Trinidad, ſhortly after it was in poſſeſſion of his Majeſty's forces, in a relapſe of the ſever. With a liberal education in all the auxiliary branches of medicine, he was a zealous inquirer, and poſſeſſed in an eminent degree all the *milk of human kindneſs*, ſo eſſential to the medical character.

> —— cui Pudor, et Juſtitiæ ſoror
> Incorrupta Fides, nudaque Veritas,
> Quando ullum invenient parem?
> Multis ille bonis flebilis occidit:
> Tu fruſtra pius, heu! non ita creditum,
> Poſcis Quintilium Deos.

We formerly recommended a reduction of the ſeamen's diet in going to warm countries, as the beſt preparative for the climate. But what are we to ſay now, when the moſt pernicious part of it, the allowance of ſpirits, has been increaſed one eighth, and that too from the imperious demands of theſe inconſiderate men themſelves. Infatuated beings! who never yet did right when left to themſelves! There can be no doubt but the changes of living in Britain, the more general uſe of animal food and ſtrong malt liquors or ſpirits, among the lower orders of people, have eminently aſſiſted in producing that groſs and full habit of body, which becomes the devoted victim of the Weſt-India fever. Look at the pampered life the Engliſh ſoldier now leads; for while he is quartered at home, he has little elſe to do but eat and drink; in ſhort, that prediſpoſition to inflammatory diſeaſes among them appears ſo ſtrong, that if they had been fed for the purpoſe, it could not be better accompliſhed. We therefore ſee how difficult it is to alter modes of living. As ſoon as theſe men are landed on a Weſt-India iſland, they eagerly graſp at ſpirits, and the more ſo, becauſe they find rum ſo much cheaper than they did at home, that there is no moderation to the uſe of it. This ſpirit is the laſt ſtimulus that is required to ſtrike fire, when the conſtitution may be ſaid to burſt into flame, till the vital principle is literally burnt out of its manſion in the ſpace of a few hours by an ardent fever. No wonder then ſo fine a regiment as the 57th ſhould, in ſo ſhort a time as three months, bury ſeven hundred men, as appears from Mr. Laing's deſcription!

From the beſt accounts which we have received, we are induced to believe, that the preſervation of our ſhips' companies very much depends on keeping them on board, and cutting off all communication with the ſhore, but on the utmoſt neceſſity. I obſerve that ſome captains have been very rigid in adhering to this rule, and they have always found advantage in ſo doing. We ſuſpect that theſe ſeas are as favorable to health as thoſe of Europe; and the facts appear now very clear. What a pity it is, then, that we ſhould ever ſo much loſe ſight of our ſuperiority, as to land an army in an enemy's iſland. The great mortality in ſhips has always happened while co-operating with the troops, or while laying in harbour; and it is now well known when ſickneſs appears, that the beſt refuge is in putting to ſea. Would it not then be a wiſe policy, for the remainder of this war, and in every future war, to blockade the iſlands by ſhips, rather than by beſieging armies?

For the reaſons now given, it would alſo be a moſt beneficial plan to employ hoſpital-ſhips at ſea, rather than ſending ſick on ſhore. The weather in the Weſt-Indies is generally ſo regular, and the ſea ſo ſmooth, that no incommodiouſneſs could happen; and ſmall veſſels might ſupply them with ſtock, fruit, and vegetables as required.

Among all the journals which we have peruſed, we have ſeen no account of any attempt to reduce the habit of body in approaching the warm latitudes: but it is a pity that it was not enforced by the higheſt authority at a more early period of the war. Bleeding, purging, and a reduction of the animal part of diet, with a ſpare allowance of wine and grog, muſt be the chief preparation. Dr. M'Clean* has very properly recommended men for military ſervice in the Weſt-Indies to be ſelected from the army at large, of an age beyond that which thoſe fevers ſo eſpecially attack. We ſhould like to ſee this take place in the navy, for the ſame arguments apply, and it would be more eaſily practiſed in ſhips than in regiments.

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* "Diſeaſes of St. Domingo." Cadell and Davies.

The following communication comes from a gentleman who had been employed in the Weſt-Indies at the beginning of the war, and had opportunities of ſeeing and hearing more on the ſubject of health than moſt navy ſurgeons: it is evidently the production of a mind accuſtomed to obſervation, and contains ſome valuable reflections on periods of ſickneſs at St. Domingo, that have already been the matter of much diſcuſſion.

"His Majeſty's Ship Succeſs,
Bantry-Bay, May 9th, 1798.

"SIR,

"As I was in the Weſt-Indies at the time your laſt Eſſays were publiſhed, I had not an opportunity of ſeeing them till my arrival in England in May laſt; then, truly impreſſed with a ſenſe of the generous efforts you had made to render the character of a naval ſurgeon more reſpectable, and his ſituation more comfortable, I wiſhed, as the only grateful return I could make, to contribute my obſervations: I began, and wrote the following; but after a review of them, I was not pleaſed with my performance: there ſeemed a want of ſomething, but my abilities could go no farther. The paper has lain by me till yeſterday, when I ſaw your circular letter: this again prompted me to ſend it, which I now do, and beg you will accept it as a teſt of my good wiſhes; and that, were my abilities equal to my vanity, this would have been better worth your reading.

"October 30th, 1795. The Succeſs relieved his Majeſty's ſhip Penelope at St. Marc's in St. Domingo, and moored within a hundred and fifty yards of the ſhore. The town is ſituated nearly in the middle of a plain, about ſix miles in circumference, ſurrounded by mountains covered with wood. On the moſt dependent part of this plain, directly oppoſite the ſhip, was a large ſwamp, remaining ſince the preceding rainy ſeaſon. This was ſpread over with ſtinking weeds covering deep mud, in which were the putrid carcaſes of different animals that had been neglected in the fields, from the place being in a ſtate of blockade, and, I ſuppoſe, coming here to drink, ſtuck in the mud and died. The ſea-breezes were irregular; the north wind moſt prevalent; in the night the air uncommonly cold and chilly, with heavy dews; in the day, when there was no wind, the heat was inſupportable; I could not, however, preciſely aſcertain the degree, from the want of a thermometer. This was the ſtate of the country and climate on our arrival, at which time we had none ſick. It ought here to be remarked, that the ſhip was well ſeaſoned to the climate: ſhe had indeed ſuffered much from the yellow fever on her firſt arrival, but was now two years in the country ſince that death-terminating diſeaſe had diſappeared. The internal diſcipline of the ſhip was the moſt exact and regular; the decks were waſhed three times a-week, when, after being well ſwabbed, fires were lighted in the 'twixt decks, and none ſuffered to go below until every part was particularly dry; but this was not done except in good weather. Tueſday and Friday were waſhing-days; Sunday and Thurſday the people were muſtered clean, and the officer to whoſe diviſion they belonged ſaw that every thing was ſo in their bags. If cleanlineſs could have preſerved the health of a ſhip's company, it would have done ſo in the Succeſs.

"We had not been at anchor more than forty-eight hours before I fancied ſigns of unhealthineſs were appearing among the people, when I immediately pointed out my fears and reaſons for them to Captain Pigot, begging the ſhip might be removed from her preſent ſituation; but this was impoſſible from the nature of the place, as there only we could contribute to the defence. This was told me with unfeigned ſorrow by our worthy captain, whoſe feelings, and whoſe humanity, were always intereſted in the relief of the ſick *. At the end of eight days three complained, with regular ſymptoms of intermittent; after this, one or more were taken ill daily. In thoſe firſt taken the ſymptoms were mild, and yielded readily to emetics and bark; but every day the diſeaſe ſeemed to increaſe in virulence; and the longer the people eſcaped, the worſe when taken; for by the beginning

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* Our readers will be concerned to learn, that this accompliſhed young officer fell a victim to the horrid mutiny that afterwards broke out on board the Hermione. The crew conſiſted in a great part of foreigners: the ſhip was carried to an enemy's port; and ſome of the murderers have ſince ſuffered for the crime in England.

ning of November it had put on the appearance of the bilious remitting fever common to the Weſt-Indies, and deſcribed by Dr. Jackſon in the diſeaſes of Jamaica. For this change I could account no other way, than that the more the watery parts of the ſwamp were exhaled, the ſtronger the miaſmata or effluvia became. About the 16th of December I was ſeized with the fever, and was unable to do any duty for two weeks, during which time nine periſhed in the moſt miſerable manner, without the leaſt aſſiſtance. I had no mate, and there was no medical help to be got from the ſhore, for there they were in a worſe ſtate than we.

"Before our arrival, as well as during this period, the troops on ſhore were daily dying of the yellow fever, particularly the 96th regiment; but this was before our ſickneſs, and the contagion could not have originated with them, as we had no communication. Might not the fever on ſhore and that in the Succeſs originate from the ſame cauſe? Might not the effects of the marſh miaſmata have been ſomewhat modified in the paſſage to the ſhip? for bad as the fever was, it was not near ſo fatal as that on ſhore. Twenty died out of one hundred and fifty that were afflicted in the Succeſs; but on ſhore, I can venture to ſay, every ſecond man who got the fever died.

"The ſymptoms have been ſo often deſcribed, that I can offer none I obſerved to be uncommon. The fit was, in general, uſhered in by chills and heats; the exacerbations were irregular. (Should you wiſh a journal of ſome of the caſes, I will with pleaſure ſend it.) On the firſt complaint, I gave a weak ſolution of tartar emetic with ipecacuanha every ten minutes, till it procured a full and free vomiting: if it had not the effect of alſo opening the bowels, I threw up an injection of common or Glauber's ſalts. When the operation of this was over, I had the patient's legs immerſed to the knees in warm water, into which I put a quantity of vinegar; but I did this with no idea of revulſion, but becauſe it was grateful to the patient, ſeldom failed of opening the ſkin and bringing on a general perſpiration, which relieved the head-ach, and often procured a favorable remiſſion; during which I gave as much of the bark as the ſtomach would bear in a variety of forms, ſuited as much as I could to the inclination of the patient; but there were many whoſe ſtomachs could not bear the bark even in the moſt delicate form. Irritation at ſtomach was the moſt dangerous and perplexing ſymptom I had to combat; to alleviate which I had recourſe to all the various remedies I had ſeen uſed, and even to them I had read of. Saline draughts in a ſtate of efferveſcence I never found any way uſeful: the tinct opii anſwered in ſome caſes, but was uncertain in its effects. Bliſters applied to the epigaſtric region, and removed when they had cauſed inflammation without bliſtering. I took them away at this time, as I found if they had not now allayed the irritation, they never did it after, and when allowed to cauſe bliſtering, they produced troubleſome ſores, on which it was difficult to keep dreſſings in a reſtleſs fever patient. Æther I found of ſervice, particularly in hiccup; but what proved more ſerviceable than every thing elſe, were draughts of cold water, which were eagerly deſired by the patient, and drank with avidity, an indulgence of which I never ſaw attended with bad effects. Cold bathing was eminently ſerviceable in putting a ſtop to vomiting: this laſt, however, appeared ſo contradictory to the ideas of ſailors, that I had much to combat from their prejudices. "Putting a man with a "hot fever," as they expreſſed, "into a tub of "cold water," ſeemed to them an unprecedented and extraordinary thing; and it was not till they ſaw the good effects of it that they could be perſuaded. The only drink I could procure was common water acidulated, and ſweetened with ſugar. Plenty of balm grew in the neighbourhood that made alſo a grateful drink, of which many were remarkably fond, and indeed attributed to it their recovery. On obſerving the leaſt ſymptom of debility, I ſupported them with wine, plenty of the beſt Madeira being then in the ſhip, to which, no doubt, many owed their lives.

"In the beginning of the intermittents (which were of all types) I alſo gave an emetic, and repeated the ſame as I judged from ſymptoms. There were an accumulation and abſorption of bile from the ſtomach, which were often particularly pointed out by the yellow appearance of the ſkin and eyes, that I have ſeen diſappear in an extraordinary manner after the operation of an emetic, which convinces me that an emetic is often uſeful in more ways than merely evacuating the contents of the ſtomach, as has been contended for by ſome. Opium, given an hour previous to the acceſſion of the cold paroxyſm, always mitigated, but I cannot ſay it ever prevented or cured one caſe of the diſeaſe; but I never truſted to it alone, my chief dependence being on the bark. On the — of January, the apprehenſion of an attack being done away, we went to ſea, and continued cruiſing off the harbour four weeks, during which the diſeaſe gradually *diſappeared*, and all got well but five, who had dropſical ſwellings, and were ſent to the hoſpital at Cape Nichola Mole.

" February. We anchored in our old place; but I found the ſwamp was nearly dried up, the weather was alſo more mild and equal, the ſea-breezes were more regular, and the night dews not ſo heavy; from which I was in hopes we ſhould now be healthy, but I was deceived; for in three days dyſentery made its appearance, and very ſoon became epidemic, though never ſo much ſo as the former: for this I could not account unleſs as the effect of the former diſeaſe. The firſt ſymptoms were headach, ſickneſs at ſtomach, with twitches in the bowels; theſe ſymptoms were the moſt general; but in others it attacked at once with bloody ſtools, violent griping, and teneſmus. With the firſt I began by an emetic, if this had the effect of opening the bowels, as well as emptying the contents of the ſtomach, it ſeldom failed of giving relief; indeed, frequently it produced a cure. For the latter I gave an ounce or ten drams of the ſal glauber; if they operated freely, I gave an anodyne at night; if the cathartics did not relieve the griping and teneſmus, I continued them three or four days, but never the ſalts after the ſecond day, as I was afraid their too ſtrong cathartic powers might deprive the inteſtines of their mucus, and thereby leave them more liable to inflammation; I preferred the more mild, ſuch as the p. rhei. ol. ricin. &c. with the anodyne at night; but this practice had not always ſucceſs, the griping, bloody ſtools, and teneſmus continued; for the relief of which I tried various remedies. Pills of ipecacuanha with opium I thought hurtful, by diſordering the ſtomach: ſpec. ſcord. opio. pulvis, and tinctura terra japonica, ext. lig. camph. confect. oniak. I gave reſpectively a fair trial, but only found them uſeful according to the quantity of opium they contained: I can ſay ſo much of the above medicines from ſelf-experience; for to what remedies will not the wretch fly, who is tortured by this cruel diſtemper? The warm bath and warm fomentations always gave a temporary relief; but I thought they tended to weaken the patient when too often repeated: a pill compoſed of three grains of calomel, with four of aſafœtida, given every four hours till they had freely opened the bowels, did great ſervice by expelling the flatus and relieving the teneſmus; they not only had this good effect, but frequently brought away a number of round hard lumps, the expulſion of which gave inſtant relief, and I thought it a great ſtep towards the cure. Glyſters compoſed of thick rice water, into which I diſſolved two drams of aſafœtida, and a dram of opium thrown up frequently, relieved the teneſmus, and often completed the cure. During the courſe of the diſeaſe I gave wine, and as nouriſhing a diet as I could procure, except in two or three caſes, where the ſymptoms of inflammation were ſo high, as to render it obviouſly imprudent. I remarked, that in thoſe who, when ill of the intermittents, had refuſed the bark, the diſeaſe ſeemed to be particularly obſtinate. It was but few I could venture to bleed, although the indications of fluſhed countenance, full throbbing pulſe, were prevalent; the reaſon was, that moſt afflicted had been previouſly weakened by fever.

"You will readily imagine that theſe complaints, with a want of vegetables and freſh meat, produced a tendency to ſcurvy; this was the caſe: no pen can deſcribe the melancholy ſtate of his Majeſty's ſhip Succeſs during the nine months ſhe lay guardſhip at St. Marc's. This diſeaſe, however, arrived at no great length; the ſymptoms went no farther than ſpongy gums; ſome had contracted hams, and effuſions of blood under the ſkin, others the dyſenteric complaints continued with, the obſtinacy of which I attributed to this diſeaſe. About a fortnight after I firſt obſerved the ſymptoms of ſcurvy, as if by the interpoſition of Providence, a Spaniſh veſſel arrived from Cuba with ſtock, and ſeveral barrels of limes, two of which I purchaſed: to them the ſcorbutic ſymptoms eaſily gave way; all recovered but one, who died ſuddenly on getting out of his hammock. June the —, we were relieved by his Majeſty's ſhip Quebec, and went to Jamaica, where freſh meat and vegetables reſtored the ſhip's company.

"I feel that I have not abilities to make this ſubject ſufficiently intereſting, and am afraid I have already taken up too much of your time; but you will excuſe me, and believe my intentions are with a view to relieve the afflicted. Under this idea I beg leave to detain you a few moments longer, to offer ſome remarks on the Yellow Fever, when it prevailed in Commodore Ford's ſquadron at Port-au-Prince.

"Previous to the ſquadron appearing before that place in May 1794, I knew of no ſhip afflicted with any contagious diſeaſe; ſome of them indeed had loſt men, but, as far as I could learn, that was by the common remittents of the country. On the capture of this port, June the 4th, 1794, about forty ſail of merchantmen were found in the harbour, moſt of them large veſſels, the cargoes of which were coffee, cotton, ſugar, and indigo, that had been ſtowed in them from one year to three, in which time many of them never had their holds opened, from the diſturbances that prevailed among themſelves. On board of them, men were ſent from the whole ſquadron, to fit them for the paſſage to Jamaica, which, from the ſtate they were in, was not to be ſoon done. The weather was exceſſively warm, and ſome days elapſed without a breath of wind. The very firſt day the people proceeded to work, many were taken ill, and ſent on board their reſpective ſhips with fever; ſeveral with ſtrong convulſions that were ſucceeded by fever, and one or two died. I was ſent to ſeveral to remove the ſick, where I found the ſtench from the damaged coffee and ſugar almoſt unſupportable: it wanted no great degree of penetration to prognoſticate the conſequences in two, where there was a quantity of ſugar, &c. melted in the hold *. I ſaw the mixture in an actual ſtate of effervefcence, and bubbling up from every part. From theſe ſhips I can vouch the diſeaſe was firſt introduced to the Penelope. I moſt truly think that the primary cauſe of this horrid diſeaſe originated from theſe ſhips: one thing is moſt certain, that if it did not originate there, it was much increaſed in virulence by our connection with them. After they were fitted out, on their paſſage to Jamaica they loſt more than three to one in compariſon with the men of war, although this paſſage was not more than ſeven days. In the Horizon, on board which was Lieutenant Gueren, and Mr. Stupart of the Europa, the crew had been replaced three times, and from illneſs got in her, died thirty men: ſeven out of ten died on the paſſage to Jamaica; another of them was picked up at ſea by a Guineaman, with every ſoul dead on board; even a number of negroes, who afterwards cleared them, died from fevers caught on board them. There was a remark I made without being in any way able to account for the cauſe,

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* We ſtill think, as mentioned in our former volume, that the mortality here was occaſioned by fixed air (carbonic acid gas), and that the diſeaſe was *ſuffocation*, either inſtant or lingering, and *not* fever.

that a perſon ſhould in one ſhip, equally bad with the others, there reſiſt the diſeaſe, yet on coming to a ſtrange ſhip, he was almoſt immediately ſeized by the contagion. I ſaw this particularly exemplified by viſitors, and by the frequent change of officers and men that happened in the flag-ſhip. On board every ſhip even at the time the yellow fever was moſt fatal, there was a number of intermittents appeared, from which I am of opinion that intermittent fever may be caught, but not communicated by contagion. I mean that contagion may be received from a perſon labouring under typhus or yellow fever, yet the diſeaſe produced by that infection may be intermittent, which intermittent cannot ſpread the contagion received; or why ſhould both diſeaſes be in the ſame ſhip, when the original cauſe producing them was the ſame?

"I had intended to have given you a ſketch of the various methods of cure adopted by the different ſurgeons, but am afraid I have intruded too far already; if you, however, think I can give any information, I ſhall be happy to continue the ſubject. I am, with the greateſt reſpect, Sir,

Your moſt obedient ſervant,

JOHN CRAWFORD."

P. S. Jan. 12th, 1799.

IN our former volume, under the article Yellow Fever, we had occaſion to mention the Dædalus frigate, Captain Counteſs, as a ſtriking example of the good effects to be obtained from a colder latitude, in completely ſubduing the diſeaſe. We have juſt been favoured with ſome valuable remarks by Mr. T. Downey, ſurgeon of the Ethalion, who acted in the Dædalus on her paſſage to Halifax and England, after the death of her ſurgeon.

Mr. Downey does not mention the name of the ſhip he had been employed in, on the Jamaica ſtation; but it appears that the fever had prevailed among the crew, and that he himſelf was a ſufferer. Having relapſed, and being extremely reduced, a voyage to a colder country was deemed the only chance for the recovery of his health. His account of the ſymptoms in the different ſtages does not materially vary from that of others; it confirms the univerſal opinion, that this fever, in its attack, is attended with every ſign of the moſt violent excitement, and ſuch as has never occurred in any inflammatory affection of the temperate zone. Blood drawn from the veins gave the appearance of a high degree of oxygenation. He ſays, "Blood taken from the veins immediately "on the patient being ſeized was uſually of a "florid red, moderately firm in its texture, and "very ſeldom ſizy; but when bled at a later "period, the blood appeared ſizy. Some that "was taken on the third day, which was the third "time that venæſection had been performed, was "covered with a very thick yellow-tinged *buff*, "the craſſamentum being *cupped*, as it has been "called, and withal exceedingly firm and ſolid: "the ſize in the two former bleedings was not "obſerved."

The atmoſphere of all warm climates probably poſſeſſes a larger proportion of oxygene than that of our more northernly latitudes; and there may be ſome peculiarity of conſtitution in unſeaſoned Europeans, that diſpoſes their blood to receive a greater quantity of this ſtimulus, and which may favour the diſeaſe in queſtion. The ſeaſoned European, the native white inhabitant, and all the people of colour, to the deepeſt black, who have reſided in the iſlands, are obſerved to be ſecure againſt the yellow fever: or if they become affected, it is from cauſes which are common to them with the new-comers from the northernly regions. The ſallow looks and complexion of theſe people certainly ſhow that their blood is not ſo florid, and conſequently leſs oxygenated, than thoſe who are ſubject to this endemic: and this fact clearly points out and confirms what has been moſt ſucceſsful in the prevention. This alſo ſtrongly elucidates the theory of Dr. Mitchill, whoſe prophylactic means entirely correſpond with the moſt approved experience on the ſubject. His doctrine does not ſuperſede what has been thought the beſt practice, and while it rather confirms it, has added other aſſiſtants that were before employed with doubt and heſitation, becauſe there was no principle eſtabliſhed to direct their application.

Particular ſpots of ſoil, and eſpecially ſwampy diſtricts of country, give out thoſe peſtiferous exhalations which ſo ſingularly affect the human body; and as we recede from the places where they are evolved, we in proportion avoid the poiſon. In other words, they are too much diluted to be hurtful; or they excite diſeaſes neither ſo acute or fatal. Mr. Crawford remarks, that though the mortality was great in the Succeſs frigate, while ſhe lay at anchor, yet, it was by no means ſo great as among the troops on ſhore, who died in a larger proportion of thoſe that were ſeized. It is, perhaps, of little conſequence in practice, whether we attribute this difference of the condition of marſh miaſma to its leſs concentrated ſtate, by diffuſion in the atmoſphere; or to its miſcibility with the water as it paſſed from the ſhore to the ſhip, which thus rendered it leſs noxious by abſtracting a part. But to return to Mr. Downey's method of treatment:

The two firſt caſes which occurred he thus treated: "I gave one perſon calomel, and from "another I took about ſixteen ounces of blood. "In the firſt caſe I did not find that relief I had "been taught to expect; the calomel neither "running off by the bowels, nor affecting the "ſalivary glands. I had not then ventured to "give ſo large a doſe as Dr. Chiſholm recom-"mends, nor to repeat it ſo often. But as the "patient paſſed over three days without any, very "dangerous ſymptoms ſupervening, I perſiſted in "its uſe till 150 grains were taken. No other "effect followed, than the pulſe becoming more "ſoft and ſlow, which before had been quick and "contracted: the ſkin alſo, which, previous to "its uſe, had been hot and dry, became more

" ſoft; but the patient lay in a ſtate little better " than comatoſe three days longer. He was " removed on ſhore, where he recovered, a plentiful ſalivation taking place as the ſymptoms of " fever declined.

" The other patient, from whom blood was " taken, ſoon felt an abatement of the pain in his " head: and in an hour after he was bled he " took pulv. jalap. ℈ij. calomel gr. x. M. This " procured nine or ten evacuations, and the next " morning he ſeemed free of complaint. I did " not, however, ſo far truſt to appearances as to " neglect giving him purges on the two following " days. The event of this caſe gave me great " ſatisfaction; and as I was yet to experience the " effect of the calomel, I put every one, of whom " I had the entire care, under the plan of evacuation by *bleeding and purging*, till an attack " of the fever compelled me to beg the ſame aſſiſtance at the hands of others.

" Out of one hundred and thirty caſes which " occurred, previous to my illneſs, the termination of one only was fatal, where the " treatment above-mentioned was fairly carried " into execution. I ſay fairly, for in one inſtance " only beſides, that had the ſame event, the " patient was not bled till the fourth day of the " diſeaſe; the evacuation evidently haſtened his " diſſolution. After my recovery, and before " I was capable of returning to regular attendance on the ſick, I ſaw ſuch ſtriking inſtances " of the inefficacy, and alſo of the baneful effect

" of *partial evacuations*, or the want of perſever-
" ance in their uſe, and ſteadineſs in the mode of
" conducting them, that I was induced to pauſe
" in my favourable opinion of this mode of
" treatment, and to endeavour carefully to ob-
" ſerve, whether the diſeaſe itſelf was not about
" to undergo an alteration in its nature.

" I ſailed from Jamaica with the convoy for
" England; and in the courſe of the paſſage to
" the Gulf of Florida, which was extremely ſlow
" and tedious, the ſquadron was very ſickly; in
" particular the Dædalus, on board of which ſhip,
" though then exceedingly weak, I went in conſe-
" quence of the illneſs of the ſurgeon, who died
" the next day. On inquiry I found that calomel
" had been uſed as the principal remedy; but the
" ſtock with which they left Jamaica having been
" exhauſted, they had for ſeveral days depended
" on ſcanty and precarious ſupplies from the
" different ſhips of war *. I once more ventured

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* I am afraid this has been too much the caſe with many other ſhips during the war. No private individual can be ſuppoſed to carry abroad a cheſt of medicine equal to ſuch expenditure as has occurred during the rage of yellow fever in a ſhip. The partial ſupply which is now granted has not half remedied the evil: there muſt be a radical change in this whole buſineſs, and every article of medicine ought to come from a public ſtock; not by ſtated allowance, but as ſickneſs and diſeaſe ſhall render demand neceſſary. I have no patience in contemplating ſuch a cold-hearted practice of phyſic as this, that pauſes with extended alms, and heſitates to do a kind action.

“ on the evacuating plan, till from the want of purgative medicines I was obliged to have recourſe to calomel. It was part of my daily employment to procure this medicine, even from the merchant-ſhips under convoy; from which we received it in the ſmall portions of ʒi, ʒij, and ʒiij, at a time, and of courſe I was hindered from giving it in ſuch doſes as were moſt likely to inſure ſucceſs. Yet the event was beyond my expectation; four people only dying on board the Dædalus out of forty-five, excluſive of ſix relapſes, making the aggregate fifty-one. Of theſe twenty-eight were treated with V. S. and purging, and one died: of twelve treated with calomel from the beginning, two died.

“ Having, in ſome of the firſt caſes where I gave this medicine, obſerved that a large quantity might be taken without procuring ſtools, I gave to the patients in the Dædalus a doſe of ſalts in the firſt place, and after three or four ſtools entered on the uſe of calomel: in this manner the medicine ſeemed to act with greater certainty.

“ The uſual conſequences of bleeding were an an abatement in the pain of the head, ſtomach, and loins. Though the pulſe had no great degree of hardneſs or fullneſs, and though the patient was often liable to faint on the loſs of four or five ounces of blood, yet theſe circumſtances did not in any caſe deter me from carrying on the evacuation, to twelve, ſixteen, or

“ even twenty ounces, if the pain in the head “ was very violent. The evacuating medicine “ having operated briſkly, ſcarce any pain re- “ mained; but in general, on the next morning, “ ſome giddineſs was complained of, which was “ relieved by another doſe of calomel and jalap, “ or ſalts; the ſame medicine was repeated on the “ third day, or on the fourth, if the patient was “ tolerably free from complaint on the third. In “ many the diſeaſe required bleeding two or three “ days ſucceſſively, or even twice in the twenty- “ four hours, as the pain of the head or region of “ the ſtomach was more or leſs diſpoſed to give “ way; and the evacuations by ſtool were always “ kept up in proportion to the bleedings.

“ In relapſes which occurred, at the end of “ ſeven to ten days, or later, the ſame mode of “ treatment was uſed; and though it was not often “ neceſſary to carry it to the ſame extent as at “ firſt, yet the good effects were equally viſible.

“ Notwithſtanding what has been ſaid here, I “ am free to confeſs, that I do not conſider the “ inſtances I have ſeen, that the diſeaſe appeared “ in its moſt violent form. We had none ſeized “ with thoſe dreadful paroxyſms which Dr. Chiſ- “ holm deſcribes in his account of the fever which “ prevailed at Grenada. I ſhould ſuppoſe it held “ a middle rank between the violent forms of at- “ tack, in which it ſometimes invades the human “ frame, and that ſlow inſidious approach, wherein “ the commotions which it occaſions in the ſyſtem “ are ſo ſmall as at the beginning eaſily to paſs

" unobſerved. Several inſtances of this kind came " under my inſpection, and are perhaps the moſt " dangerous form of the diſeaſe, as, before we are " aware of its exiſtence, the time for acting with " effect is elapſed.

" A reliance on the bark in this diſeaſe, when " given either at the onſet or during a remiſſion, " has, I conceive, been productive of much miſ- " chief. Valuable as this medicine certainly is, " can it be indicated, where both the ſymptoms " and diſſections mark a ſtate of the viſcera in " which inflammation prevails early, but particu- " larly in the ſtomach; and which, even in the " fevers of our own climate, would render its " exhibition uſeleſs? That there was a *fair remiſ- " ſion* procured ſo early as the evening of the firſt " day, in many caſes, is not to be diſputed: the " next day, on a return of the leading ſymp- " toms, the ſame remedies were uſed, and another " remiſſion followed as perfect as the former. No " advantage was taken of this to throw in the " bark; but by continuing the ſame plan of " treatment, viz. a repetition of V. S. the ſecond " day, with purging the firſt three or four days, " or later, if the ſymptoms were not entirely gone " off, the remiſſions became at length ſo complete " as to end in a perfect recovery: and the facility " with which the fever was ſubdued, under this " ſimple mode of practice, would have almoſt " induced one to doubt of it being the ſame diſ- " eaſe which a few days before was carrying off " the ſhip's crew in the proportion of one in every

" three; twenty-ſeven men having died out of " ſeventy-one, who were taken ill previous to my " joining the Dædalus, and this too in the ſhort " ſpace of three weeks.

" If the opinion that the original character of " this diſeaſe is inflammatory, be well founded, " the greater violence of the attack will only indi- " cate a more diligent uſe of the evacuations here " recommended; as the early or later approach of " the putreſcent ſtage is certainly in proportion. " But even in the mildeſt forms of the diſeaſe, the " bold and deciſive application of theſe remedies, " and the continuance of them, more particularly " the purging, even for three or four days after the " ſymptoms ſhall have ceaſed, is abſolutely neceſ- " ſary. The diſeaſe during the firſt two or three " days by evacuations will appear to give way, and " to be ſubdued; but the complaints have a conſtant " tendency to return; and it is only for them to " be neglected a day or two, when they will to a " certainty prove fatal. Nothing, therefore, leſs " than a full conviction of the patient being fairly " out of danger, and free from fever, could induce " us to lay aſide the proper remedies.

" It often happens that the men neglect to ap- " ply to the ſurgeon, till the diſeaſe has been ſome " time preſent, eſpecially when the ſymptoms are " heavineſs of the head, and the ſtomach but little " affected. They find themſelves not ſo ill as to " think it neceſſary to quit their duty, but in the " courſe of performing it, are often obliged to lie " down, more particularly in the night watches:

" and the firſt notice I have had of many men " being under the influence of the diſeaſe, was, " that while walking the deck in their watch, " they ſtopped, and frequently laid their heads on " a gun for ſome minutes. In theſe caſes a very " material queſtion occurs, as we are required to " attempt drawing a line, when bleeding and " purging may be uſed with effect, or when a " preference may be given to mercury. If I had " my choice of the two modes of practice, and " the patient ſhould make his firſt application " within the firſt two days, I ſhould not heſitate " to prefer evacuations. On the third day much " muſt be left to the judgment of the practitioner; " but after this period, perhaps in the afternoon " of the third day, I would rather truſt to calomel. As alſo in caſe the evacuating remedies " uſed from the firſt ſhould fail of ſucceſs, the " relief afforded by theſe is generally ſo very viſible, that a little practice will enable us to judge " when their continuance is likely to be availing " or not. Therefore, if after *a fair trial* given to " evacuations, within the firſt two days, the ſymptoms ſhall not have greatly ſubſided, but particularly if the affection of the ſtomach ſhould be " preſent with great tendency to coma, I ſhould " conſider this medicine a *ſheet-anchor*, if any " article in the Materia Medica can be worthy " ſuch an appellation: and I have ſeen ſuch inſtances of recovery from ſtates ſo apparently " deſperate, by its uſe, that I ſhould always conſider it worth ſubmitting to a trial. We cannot

" ſtamp a due value on our remedies by the number of recoveries alone; the eſcape of a ſingle perſon from ſome of thoſe dreadful ſituations, which occur in the courſe of Weſt-India practice, tends to ſhow the value of the treatment more than that of ten patients, who apply immediately on being taken ill.

" In thoſe deſperate caſes, however, every moment is to be made the beſt of; and conſidering that nothing can be loſt, the medical attendant, guided by rational views in the choice of his medicine, is juſtified in putting it to the utmoſt extent in point of quantity *.

" With reſpect to the operation of the remedies here recommended, I do not know how far their effects will be allowed to act on the abſorbent ſyſtem. The influence of mercury on this ſeries of veſſels, we can readily perceive; we know alſo they will not be lightly affected by the uſe of evacuations, producing the effect, perhaps, that Sydenham meant to expreſs when he ſpoke of *cooling the body*. And it is poſſible, that in this manner the fever at Gambron, men-

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* " A gentleman of long practice in Dominique aſſured me, that at a late period of the diſeaſe, the patient then labouring under the ſymptoms of black vomiting, and every other appearance portending ſpeedy diſſolution, had given calomel in the doſe of one dram; and the patient recovered after an enormous diſcharge of almoſt black fæces. The ſame gentleman informed me that the black vomiting in another caſe was ſtayed, after ſuffering the patient to drink as much new milk as he pleaſed."

" tioned by Sir John Chardin, was cured; in
" which the practice was to pour cold water on
" the ſurface of the body, while purging was kept
" up at the ſame time.

" Does the daſhing of cold water on patients,
" in this fever, in caſes where it is ſucceſsful, ex-
" cite the animal powers to actions, tending to
" reſtore a proper balance in the lymphatic ſyſ-
" tem, and thereby obviating the fatal tendency
" of the diſeaſe?

" It is with much pleaſure I mention the ſalu-
" tary effect of a colder temperature. It was firſt
" inſtanced in the freſh names on the liſt be-
" coming every day leſs in number. And after
" we had bore away for Halifax, in the laſt five
" or ſix caſes who were taken ill, the ſymptoms
" were ſo mild, that they required purgative me-
" dicines only. I have not, therefore, included
" them in the number of ſick above-mentioned,
" in the Dædalus; the greateſt part of whom
" were ſeized in the Gulph of Florida, or in the
" courſe from Jamaica to that place."

It is now to be obſerved, from this narrative, that Mr. Downey's treatment of the yellow fever is the beſt epitome of Dr. Moſeley's practice that we have yet ſeen. He is alſo ſtrongly impreſſed with the advantage of the mercury in large doſes, according to the example of Ruſh and Chiſholm, and ſome wonderful recoveries ſeem to have given riſe to this partiality for a medicine that, ſetting aſide its purgative effects, appears to have been exhibited on very vague principles, in the hands of the two phyſicians who firſt inculcated its adminiſtration in this fever. The diſeaſe diſappeared almoſt at once off Halifax; and is not this a plan that ought always to be imitated when our ſhips become ſickly in the Weſt Indies? Captain Counteſs, who commanded the Dædalus during this affliction of three parts of her crew, was ſo kind and condeſcending as to give up his whole cabin to accommodate the ſick; by which means every advantage was gained that could be obtained from a pure cool air, cleanlineſs, and all other tender offices ſo neceſſary in a trying ſituation. A deed of this kind reflects ſo much luſtre on the naval character, that it is impoſſible to withhold the mention of it; and I think that officer knows me too well to ſuſpect that I can act the part of a flatterer here.

MEDICINA NAUTICA.

THE SMALL-POX.

WE have remarked, in our former volume, the very frequent occurrence of Small-Pox in his Majeſty's ſhips, by infection imported by means there ſtated. Freſh inſtances having come under our knowledge, we think it of ſufficient importance to reſume the ſubject.

The Queen Charlotte, as reported to me by Mr. Caird, carried the contagion to ſea, in the cruize with Vice-Admiral Colpoys, in November and December 1796. This infection was diſtinctly traced to a man who had juſt come from Haſlar Hoſpital, and was firſt taken ill. Of this diſeaſe, at that time, eight caſes occurred during the cruize. The ſmall-pox were chiefly of the diſtinct ſort; and only one died, a boy. This ſhip had the diſeaſe on board ſeveral times before; and there were not now many who never had the infection: but from having the advantage of a third deck, and the utmoſt attention being paid to keep the ſick from the healthy, it was confined to a few ſubjects.

In Auguſt 1797, the ſmall-pox appeared on board the Mars at ſea, of the confluent kind.

This afforded me an opportunity to make ſome propoſals to the Lords Commiſſioners of Admiralty on the buſineſs, which was done in the following letter:

"SIR, Meduſa, Torbay, Aug. 29, 1797.

"I beg you will be pleaſed to ſubmit the following propoſal to their Lordſhips' conſideration.

"The ſmall-pox having lately appeared in the Mars, the contagion had been communicated in the following manner, as reported to me by the ſurgeon's mate. John Jones, a cook's mate, was ſent to Haſlar for another diſeaſe: in one of the beds where he lay, he complained of the offenſive ſmell of the ſheets, and they were changed next day. In the mean time he recovered, and was ſent to his ſhip; and after being a few days at ſea, the ſmall-pox appeared, of the confluent kind, and he died ſoon after the eruption. Samuel Herbert, another cook's mate, who lived with him, was quickly infected; but on his caſe being reported to me, he was immediately moved to the Meduſa. He died on the third day of the eruption, which was confluent. On the ſhip's company being muſtered, there were found fifty ſeamen, eight marines, and a boy, that never had the diſeaſe. They refuſed inoculation: but there are ſome hopes, from the timely ſeparation of the laſt caſe, that the contagion is overcome.

"This is one of many inſtances which have occurred during the war, of the variolous contagion being ſpread from the hoſpital. The hazard that the lives of individuals, and the purpoſes of ſervice, are expoſed to, in conſequence, ſufficiently warrant our inveſtigation. We ſee that a large proportion of the Mars' people have not paſſed the diſeaſe; and I apprehend, upon an average, the ſame number will be found in other ſhips. The experience of former wars has not been exactly detailed for our guide or information; but I ſuſpect that it had been attended with great mortality from ſmall-pox. In the preſent war, from the enemy being beat from the face of the ſea, the danger has been comparatively ſmall, as it has given ſhips the opportunity of being cleared. But ſound policy and a recording practice of phyſic ought to think for poſterity, and furniſh them with the means which our knowledge and obſervation have given us, in order to alleviate the hardſhips of a ſea-life, and prevent ſimilar evils.

"During the ſhort period of my attendance at Haſlar, many caſes of ſmall-pox appeared in different wards, which, though the infection was traced with difficulty, it was decidedly proved to have taken place within the walls. Had theſe patients not ſickened before leaving the hoſpital, the contagion muſt have ſpread in the ſhip, as we have ſeen it in the Queen Charlotte, Orion, London, &c.

"It was a fault in the conſtruction of the Naval hoſpitals to admit this diſeaſe within the roof with other patients. So ſubtle is its nature, and ſo eaſily is it conveyed, that the clothes of a perſon in health will carry it from a ſick chamber, and affect others at many miles diſtance.—(*Vide* MED. NAUT.)

" For theſe reaſons and for many others, too minute to be detailed here, I beg leave to ſuggeſt to their Lordſhips ſome building, to be conſtructed at a ſufficient diſtance from the hoſpitals, ſolely for the reception of Small-Pox, with kitchen, *waſh-houſe*, &c. entirely confined to this inſtitution.

" From the long experience which I have had of their Lordſhips' attention to the ſubject of health in the fleet, I need the leſs apologiſe for troubling them now; and I have embraced the opportunity which a recent infection in the Mars has added to former obſervations. I have the honour to be, Sir,

" Your moſt obedient and humble ſervant,

" T. TROTTER.

" To EVAN NEPEAN, Eſq."

My propoſal received due attention from their Lordſhips, and was ſubmitted to the conſideration of the Commiſſioners of Sick and Wounded; and their report was tranſmitted to me, which was briefly, that they did not ſee any neceſſity for a ſmall-pox ward at a diſtance from the other hoſpitals. A ſubject of ſuch moment had a claim to all the attention that could be given it; and the evidence which we have produced appears to us convincing. We think that a ſmall building in the moſt retired part of the hoſpital-ground at

Haſlar and Plymouth, a ſmall area round it for the benefit of convaleſcents, with a kitchen and waſh-houſe, to cut off all communication with other patients, might be erected for a trifling ſum.

Some improvement, however, took place in conſequence of this repreſentation. A door communicating with the common ſtaircaſe of other wards was built up: but let any perſon conſider the facility with which this diſeaſe is imported, and let him examine the ſituation of ſmall-pox wards at theſe hoſpitals, and he will not fail to think as we do. The back windows of the ward at Haſlar front thoſe of other wards, and the ſpace is not many feet diſtant for a current of air to convey infectious matter. When we, in the fleet, have ſo often followed up its ſource to the hoſpitals; is it not likely that it alſo is carried from them to the neighbouring towns, and kept conſtantly alive. We moreover contend that it is inconſiſtent with the ſpirit of medical juriſprudence to admit the ſmall-pox infection within an hoſpital with other diſeaſes, to whom it is liable to be conveyed; we therefore chooſe to *record* the fact, that it may benefit poſterity. "If Rome muſt fall, we are innocent."

The timely ſeparation of the infected ſubject, by moving him to the Meduſa, ſaved the people in the Mars. The brave crew of that ſhip were reſerved for a happier fate. In the ſpring following they chaced from the fleet and came up with L'Hercule of 74 guns, which ſhip was obliged to anchor on account of the tide, and after an obſti-

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nate reſiſtance, during which the Mars attacked her opponent ſo cloſe as to unhinge her own lower-deck ports, the Frenchman ſtruck. In this conflict the gallant and worthy Captain Alexander Hood fell, with a number of his people, than whom a better man never bled on the deck of honour!

The following extracts are taken from a letter of Mr. Peter Cullen, ſurgeon of L'Eſpion frigate, in the North Sea, to Mr. John Leggat of Le Puiſſant, at Spithead, dated April 9th, 1797, and by him communicated to me. They are of a practical nature, and may be uſeful to others. L'Eſpion imported the ſmall-pox at Yarmouth.

“ It appeared firſt in one of the boys, who had
“ ſlept two nights on ſhore: he had an immenſe
“ load of them, of a bad kind, and he died on
“ the eleventh day. The diſeaſe was not aſcertained
“ nor even ſuſpected till the eruption appeared.
“ From the violence of the eruptive
“ fever he was confined to bed; and, ſuppoſing
“ it a common fever, I was prevented from uſing
“ the ſtrict refrigerent plan, which you know is
“ more or leſs effectual, in proportion as it is
“ employed before the eruption. As ſoon as the
“ diſeaſe was known, I had him inſtantly removed
“ under the half deck, and gave warning to ſuch
“ as never had the infection, (who were to the
“ number of ſeventeen,) to avoid all near communication
“ with the infected. I immediately
“ propoſed the inoculation, but the captain, afraid
“ of weakening his ſhip, objected to it till we

"came into port; and wiſhed only for means to "be taken to prevent its ſpreading. He was "therefore kept ſeparated, and all communication "prevented; and after his death every thing he "had was thrown overboard. The ſick berth "was well ſcrubbed and waſhed with warm water "and ſoap, the ports opened on each ſide, and "fires lighted. The infection did not make its "appearance again till a day or two after our "return to Yarmouth. But it is ſtill a query "whether it might have been prevented by the "means uſed, and our ſtaying at ſea; or going "to another port where there was no riſk of "getting a freſh infection. From the analogy of "a town, houſe, or hoſpital, where it will be propagated in ſpite of all precautions, I am diſpoſed "to think that there is no eradicating that ſpecific "contagion; that all we can do is, by early inoculation, to moderate it only. And if I miſtake "not, theſe are alſo the ideas of moſt of our profeſſion, and of our worthy phyſician Dr. Trotter. "When you have an opportunity, be ſo good as "aſk the doctor, whether or not an early inoculation ſhould be practiſed in ſhips at ſea, where "there is no hoſpital-ſhip, and not to truſt to "means of prevention? The doctor approves of "immediate inoculation, where there is acceſs to "an hoſpital or hoſpital-ſhip; but what is to be "done otherwiſe? I have inoculated ſeven out "of the ſeventeen, and four have been ſent on "ſhore with the natural infection: the others "would not ſubmit to inoculation."

In vol. i. p. 388, MED. NAUT. our opinion is given clearly in favor of immediate inoculation. We do not think inoculation can much weaken any ſhip's company, if the whole were inoculated at once that we have ever found uninfected in one ſhip. The diſeaſe under the uſual circumſtances has uniformly been ſo mild, that the patient has never been confined to bed more than in health. There have, no doubt, been inſtances of a ſingle caſe recovering on board, without infecting others; but we know no certainty of imitating this, and the hazard otherwiſe is ſo great, that no time ought to be loſt in giving the ſeaman a chance of eſcaping the natural ſmall-pox by timely inoculation.

In the courſe of laſt ſummer, four ſhips of the line had, by different means, imported ſmall-pox. The Triumph received it from a woman attending the ſhip in May, at Torbay, who came out of a houſe where the diſeaſe prevailed; and from her clothes a boy was infected. It appeared juſt as the fleet was going to ſea, and Sir A. Gardner ordered a cutter to carry the boy to Plymouth Hoſpital, ſo as to prevent the further progreſs *. In Auguſt, a man ſickened on board the Queen Charlotte, and when his caſe was found to be ſmall-pox, was immediately ordered away by Sir C. Thompſon, in Cawſand-Bay. In October, the Ruſſel, while in Hamoaze, was cleared, by ſending to the hoſpital the firſt infected ſubject that appeared.

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* The ſame ſhip imported the infection at Spithead in December laſt, and was cleared with equal ſucceſs.

It is neceſſary to mark the circumſtances attending particular inſtances of infection, that the fact may appear more ſtriking, and our means of prevention more correct and ſecure.

The contagion on board the Captain became more ſerious; as explained in the following letter from Mr. Farquhar the ſurgeon.

"On board his Majeſty's ſhip Captain,
"SIR, off Breſt, 17th Aug. 1798.

"I had the honor of receiving your letter of yeſterday's date, requeſting to know how the variolous contagion was received on board this ſhip; what progreſs it has made among the people; and what ſteps have been taken for the ſecurity of thoſe who never had the diſeaſe.

"In anſwer to which, I have to acquaint you, that the infection was undoubtedly brought on board from Plymouth-Dock, as the ſmall-pox made their appearance on Ph. Park, one of the ſeamen, (on the 4th June laſt,) only two days after our ſailing from that place, where the diſeaſe was at that time epidemic. On the 19th June, another of the ſeamen was ſeized with them; both of whom were landed at Plymouth Hoſpital on the 21ſt, the ſhip having put into port principally on this account. We again left Plymouth on the 25th of June; ſince which time eleven of the ſhip's company have been ſeized with the diſeaſe at different times; four of whom, I am ſorry to add, have died, all of them being loaded with the confluent ſmall-pox of the worſt kind. There are at preſent four on the liſt, who are all doing well. The ſteps which have been taken for the ſecurity of thoſe who have not had the ſmall-pox, are, removing the patients into the ſick berth under the forecaſtle, as ſoon as the diſeaſe makes its appearance, where they are entirely ſeparated from the ſhip's company, and where proper ſentinels are placed to prevent any communication being had with them; waſhing and fumigating all the clothes, bedding, &c. of thoſe who recover, previous to their returning to their duty; and taking care to prevent any of thoſe who have not had the diſeaſe from ſleeping near them.

"Every attention has been paid to keeping the patients as cool as poſſible, the ſick berth, beſides being kept dry and clean, has been regularly fumigated twice a-day with the nitrous gas. The whole ſhip is kept very clean, frequently fumigated, and as dry as circumſtances will admit of.

"I cannot help regretting that the man who was firſt ſeized with the ſmall-pox, was not immediately removed from the ſhip, application having been made to the commander in chief for that purpoſe by Captain Aylmer: had that been the caſe, I think it is very probable that the diſeaſe would not have again made its appearance. There are between forty and fifty of the ſeamen who have not had the ſmall-pox.

"Should any thing occur to you, which you think will tend to prevent the farther progreſs of the contagion, I beg you will do me the honor of communicating it. I am, Sir, with the greateſt reſpect, your moſt obedient and very humble ſervant,

"JAMES FARQUHAR.

"T. TROTTER, Eſq.
Phyſician to his Majeſty's fleet."

For the reaſons juſt narrated, this diſeaſe ſubſiſted ten weeks during the cruize, and the ſhip was only cleared at laſt by getting to port. The ſmall-pox were of the worſt kind; for out of fifteen taken ill, four died on board, and three at the hoſpital, which is a large proportion.

The Captain after all brought into port forty-two men, who were unconſcious of having had the diſeaſe. The Lords Commiſſioners of Admiralty were pleaſed to direct theſe men to be received at the Royal Hoſpital, if they wiſhed to be inoculated; but it was left to their own choice, and only four out of the whole would ſubmit to this practice. Mr. Farquhar obſerved that nitrous gas acted powerfully in correcting the ſmell of the ſick berth, when the effluvia from the confluent ſmall-pox, became very offenſive.

Before we leave this ſubject, we beg leave to repeat, that we have always found this contagion completely checked, provided the patient is removed before the third day of the eruption. We therefore ſuppoſe that the contagious matter has not acquired ſufficient virulence at that period to communicate the diſeaſe.

In 1797 the Creſcent frigate, on the Cape of Good Hope ſtation, captured a Guineaman full of ſlaves. The contagion of ſmall-pox, ſomehow or other, was received among them; nothing but inoculation could ſave the cargo. Mr. Anderſon the ſurgeon, therefore, with great promptitude, inoculated the whole, all of whom, I believe, did well, and thus ſaved a valuable prize to his officers and ſhipmates. In ſuch ſituations we would always recommend a ſimilar practice.

While I am employed in compiling theſe remarks, at my return from ſea in November, I find the attention of the medical world earneſtly engaged in aſcertaining the validity of new evidence on this diſeaſe; evidence pregnant with wonders, and opening a proſpect of ſecuring the human frame againſt one of its moſt alarming diſtempers!

A treatiſe by Dr. Jenner, on an epizootic diſeaſe, commonly known to dairy farmers by the name of the Cow-Pox. This treatiſe has been followed up by a work of Dr. George Pearſon, intitled, "An Inquiry concerning the Hiſtory of the Cow-Pox, principally with a view to ſuperſede and extinguiſh the Small-Pox [*]." In conſequence of queries ſent to different parts of England, to phyſicians and ſurgeons, by the learned and indefatigable author, a maſs of evidence is produced of the moſt ſatisfactory kind, and from which Dr. Pearſon has drawn the following corollaries:

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[*] Johnſon, St. Paul's Church-yard, London, 1798.

I. "Perſons who have undergone the *ſpecific fever* and *local diſeaſe*, occaſioned by the cow-pox infection, communicated in the accidental way, (who had not undergone the ſmall-pox,) are thereby rendered unſuſceptible of the ſmall-pox."

II. "Perſons who have been affected with the ſpecific fever and peculiar local diſeaſe, *by inoculation of the cow-pox infection*, who had not previouſly undergone the ſmall-pox, are thereby rendered unſuſceptible of the ſmall-pox."

III. "The diſeaſe produced by inoculating with the matter of the cow-pox, does not differ from the diſeaſe produced by inoculation with the matter from the human animal; nor is any difference obſerved in the effects of the matter from the firſt human ſubject infected from the brute animal, or from the matter generated ſucceſſively in the ſecond, third, fourth, or fifth human creature, from its origin in the brute."

IV. "A perſon having been affected with the ſpecific fever, and local diſeaſe, produced by the cow-pox poiſon, is liable to be again affected by the ſame poiſon as before; and *yet* ſuch perſon is *not* ſuſceptible of the ſmall-pox."

V. "A perſon is ſuſceptible of the cow-pox who has antecedenly been affected with the ſmall-pox."

VI. “ The cow-pox is not communicated in the ſtate of effluvia or gas ; nor by adhering to the ſkin in an imperceptibly ſmall quantity ; nor ſcarce, unleſs it be applied to diviſions of the ſkin, by abraſions, punctures, wounds, &c.”

VII. “ The local affection in the cow-pox, produced in the caſual way, is generally more ſevere, and of longer duration, than uſually happens in the local affection in the inoculated ſmall-pox ; but in the cow-pox the fever is in no caſe attended with ſymptoms which denote danger ; nor has it, in any inſtance, been known to prove mortal.”

VIII. “ No conſequential diſeaſe, which ſhould be attributed to the cow-pox, has been obſerved ; nor has any diſeaſe been excited, to which there previouſly exiſted a diſpoſition ; nor has it been diſcovered to produce a prediſpoſition to particular diſeaſes.”

IX. “ The cow-pox infection may produce the peculiar local diſeaſe belonging to it, but without the diſorder of the conſtitution ; in which caſe the conſtitution is liable to be infected by the ſmall-pox infection.”

Such are the concluſions drawn from the extenſive inquiries of this great phyſician, and promiſe much benefit to mankind. The heart of every honeſt man muſt warm at the peruſal of theſe pages, that unfold to ſociety the diligent and active labours of the medical profeſſion to leſſen the evils incident to human nature. And ſhould the whole anſwer the wiſhes of every lover of his ſpecies, we ſhall hope to ſee ſome of the Glouceſterſhire cows transferred to the navy farm, that ſurrounds the walls of Haſlar Hoſpital, for the purpoſe of inoculating the whole ſeamen at Spithead, and thus prevent any return of that infection into our ſhips of war, that we are now employed to defeat.

MEDICINA NAUTICA.

EPIDEMICAL OPTHALMIA.

ACCOUNT *of an* EPIDEMICAL OPTHALMIA, *that prevailed on board his Majeſty's Ship* SATURN.

By Mr. JAMES REILLY, Surgeon.

"SIR,

"IN compliance with your requeſt, I herewith ſend you the hiſtory of a ſpecies of Opthalmia, that prevailed on board his Majeſty's ſhip Saturn in her late cruize off Breſt; during which we had not leſs than three hundred attacked with it in the month of October.

"The ſymptoms were, pains in one or both eyes, with dimneſs of ſight, and an uneaſy ſenſaſation, as if ſand or ſome extraneous ſubſtance had inſinuated itſelf between the palpebra and eye-ball, the tunica abluginea highly inflamed, and the veſſels thereof very turgid. In ſome caſes, quickneſs of pulſe and febrile ſymptoms accompanied; alſo ſevere headach.

"In treating it at firſt, I gave cooling purges, indulged the uſe of the lancet, and had recourſe to aſtringent collyria; which practice I found to ſucceed.

"After theſe I gave calomel, to the quantity of five grains at night, and an ounce of natron vitriolatum in the morning, which in every caſe except four effected a cure.

"Theſe four patients had, from the beginning of their indiſpoſition, ſymptoms of typhus: ſuch as great debility, dejection of ſpirits, diſturbed ſleep, nervous complaints, and much ſickneſs at ſtomach, with low pulſe. Although their eyes were very much inflamed and painful, and complained conſtantly that ſand had got into them, I was under the neceſſity of varying the treatment. On the third day there appeared a great diſcharge of ſaliva, of a red colour, and ſeemed to come chiefly from the gums. Three of them, from a liberal uſe of wine and bark, with opium at bed-time to procure reſt, recovered, after a long and painful confinement: the other died, with ſymptoms of great putreſcency.

"The cauſe of this general malady, I believe to have been ſome peculiar conſtitution of the atmoſphere. At this time alſo the people had been miſchievous enough to heave the hanging ſtoves overboard; and the moiſture was never ſufficiently dried up, prior to its making ſo rapid a progreſs. When the weather was damp, and the wind blew from the ſouthward and eaſtward, I had more falling ill, than when the wind came from a different quarter: as the wind, therefore, ſhifted, our ſick-liſt fluctuated accordingly.

"We

“ We at this time ſcraped the between-decks, in preference to waſhing; and took every poſſible pains to prevent the accumulation of humid air. I agree with that diſcerning officer, Sir Roger Curtis, that this is the prediſpoſing cauſe of numerous evils in our ſhips, as expreſſed by him in thoſe neatly-arranged remarks of his, publiſhed in your MEDICINA NAUTICA. I have the honour to be, with great reſpect, Sir,

“ Your moſt obedient and humble ſervant,

(Signed)

“ *Nov.* 30, 1797. “ JAMES REILLY.”

“ To Dr. TROTTER.”

We have known ſeveral inſtances of Opthalmia being epidemical in his Majeſty's ſhips in the manner deſcribed by Mr. Reilly; and it always occurred during a ſimilar conſtitution of the atmoſphere, a thick haze, ſomething like what is obſerved to produce catarrh, and a cold eaſterly wind.

It has always been remarked, that an eaſterly wind peculiarly affects the inhabitants of Britain; our univerſally prevailing influenzas have always been accompanied with an eaſterly breeze, and by it ſeemed to be imported from the Continent of Europe. By finding the eyes ſo eaſily affected by chemical ſtimuli, we might ſuppoſe that ſome of theſe impregnate the air, and excite thoſe painful opthalmias. But what theſe ſtimuli may be, it muſt be difficult to find out; and where they originate and are firſt diffuſed in the atmoſphere, appears to ſet inveſtigation at defiance.

In the ſpring of 1793, while the Vengeance lay at Spithead, a diſeaſe of this kind was general among the people: it firſt affected one eye, and afterwards the other, but ſeldom ſeized both at firſt. My own eyes being weak, and eaſily affected by the weather, I was one of the firſt ſufferers. My cure was accompliſhed by keeping in the dark, for the pain was ſo acute that my eyes could not bear light, bathing the eyes in cold water, and abſtinence. In ſevere caſes, however, where the blood-veſſels of the tunica conjunctiva are very turgid, I would recommend opening them, by puncture, as giving moſt ſpeedy relief, almoſt inſtantly; and next to this, blood to be taken away by cupping the temples. Bliſters in the later ſtage are ſometimes uſeful; but we think the ceruſſa acetata and vitriolated zinc often do much harm, when applied before the inflammation declines.

MEDICINA NAUTICA.

NITROUS ACID IN SYPHILIS.

On the Effect of NITROUS ACID *in the Cure of* LUES VENEREA.

THE attention of the medical world has lately been called to a new antiſyphilitic remedy, in the nitrous or nitric acid, firſt tried and recommended by Mr. Scott, of Bombay, whoſe account of it was publiſhed by Dr. Beddoes, in the laſt part of his "Conſiderations on the Medicinal Uſe of Factitious Airs," Johnſon, London, 1797. A ſucceſsful cure of an obſtinate venereal diſeaſe, performed at Briſtol by the nitric acid, alſo accompanied the narrative of Dr. Beddoes.

On receiving the earlieſt information I ſpeedily communicated it to ſome of my medical friends; and three caſes were cured by the acid in the ſpring of 1797, all of them ſoldiers in the Weſt Kent regiment of Militia, then lying at Portſmouth, by Dr. Huggan, the ſurgeon to that regiment. Theſe caſes were juſt mentioned in a letter to Dr. Rollo ſoon after, when correſponding with him on the ſubject of diabetes. And much about the ſame time Dr. Browne, ſurgeon to the Royal Sovereign, the flag-ſhip of Vice-Admiral Sir Alan Gardner, adminiſtered it to ſeveral ſyphilitic patients, which was the firſt trial in the Navy. I ſhall add a ſhort detail of Dr. Browne's practice.

CASE I.

Tyſon Wilſon, ſeaman, aged about thirty, was the firſt patient on whom the acid was tried. He had contracted a venereal complaint about four years before at Liverpool, and had undergone a regular courſe of mercury, by which he was apparently cured. But from that time he had been frequently attacked with what was deemed rheumatiſm, and had been ſent to Haſlar Hoſpital for that complaint. Suſpecting a lurking virus, I had frequently adminiſtered mercury ſo as to excite a ſlight ptyaliſm, and kept it up for ſome time. At the time he began the acid, he had been under a mercurial courſe with decoct. lign. &c. for three weeks, without any apparent advantage. The ſymptoms of lues on firſt uſing the nitrous acid were, large nodes on the tibia of each leg ſo exquiſitely ſenſible, that the ſlighteſt touch made him cry out; a large glandular ſwelling under his chin, ulcerated, and diſcharging acrid fetid matter; nodes beginning on his arms; ſwellings on the joints of

his

his fingers; copper-coloured dry crusty ſcabs over his head; conſtant fever; high-coloured urine; no appetite; nocturnal pains ſo ſevere, that two grains of opium ſeldom procured him an hour's reſt; hectic ſweats about his neck and breaſt, and great debility. It was my intention to have ſent him again to Haſlar, when you put Dr. Beddoes's firſt account of nitric acid being uſed in venereal complaints into my hands. I thought him a very proper ſubject, and immediately deſiſted the mercurial courſe. I procured ſome of the beſt acid I could find in Portſmouth, and began him with ſeventy drops in a quart of water, to be taken in the twenty-four hours. Having heard me converſing in the ſick berth with the young gentlemen concerning this new medicine, he was ſtrongly prepoſſeſſed in its favor, and like a true ſailor, thought the more he could take the better, and the ſooner he ſhould be well. At the hour of viſiting the ſick, ſix o'clock in the evening, he had finiſhed his bottle. I was rather diſpleaſed at his hurry; but as he felt no uneaſineſs at his ſtomach, comforted myſelf with the hope he had not taken too much. Next day I increaſed his doſe twenty drops; which I did daily, till he took two hundred and twenty drops, which I found as much as his ſtomach could bear.

On inquiry how he was the morning after the uſe of the firſt bottle, he ſaid he had been in heaven (his own phraſe) all night; that he had ſix hours ſound ſleep, and felt much ſtouter. About the ſixth day, I think, to his great ſurpriſe and my ſatisfaction, he could allow me to handle his nodes freely, ſo much was their ſenſibility diminiſhed. In ſhort, the cure went on as favorably as could be wiſhed; the abſceſs healed, the nodes gradually diſappeared, and in twenty-eight days, the 14th of May, he returned to his duty, a ſtronger and healthier man than he had been for four years.

The only inconvenience he felt during the uſe of the acid was an *ardor urinæ*, for which he drank linſeed-tea; complained he had too much appetite, and ſaid that he had not *time enough* during the night for ſleep. Since his diſcharge from the liſt he has enjoyed uninterrupted good health, notwithſtanding our having been almoſt conſtantly at ſea during the laſt ſix months.

CASE II.

Philip Auſtin, aged twenty-nine, one of the other patients, whom I informed you was taking the acid. He had alſo long laboured under the baneful effects of the venereal virus: ſailors ſeldom complain too early to a ſurgeon; and it was owing to his receiving a hurt that I firſt diſcovered his complaint, for which he was put under a courſe of mercury, &c. I learned that he had been twice ſalivated for the ſame diſeaſe, (once in London,) and thought himſelf well. It is needleſs to particulariſe the various changes of his complaint; ſuffice it to ſay, when he began to take the acid, his left teſticle was diſeaſed, very much enlarged, adhered to the poſterior portion and lower part of the ſcrotum, ulcerated, and diſcharging a thin fetid matter, large hard dry ſcabs all over his legs, thighs, and elbow-joints, a ſlight paralytic affection of the left arm and eyelid, an incontinence of urine on catching the leaſt cold, and great pains of his bones, particularly the head.

This man began to take the acid about the ſame time that Wilſon did, with equal good effect. It is to be remarked, that after uſing the acid a week, the dry cruſty ſcabs began to peel off, and ſome of the largeſt diſcharged a good conditioned pus, were treated as a ſimple purulent ulcer, and healed as kindly. The ulcer of the ſcrotum healed in four weeks; the teſticle was ſomewhat reduced in ſize, and free from pain. He returned to duty on the 1ſt of June.

This man never could take more of the acid in twenty-four hours than one hundred and ſeventy drops. About three weeks after he returned to his duty, one of the largeſt ſores on the upper part of his leg broke out afreſh, for which he took eight bottles more of the acid drink. It ſoon healed, and he has ever ſince enjoyed good health.

CASE III.

John Evans, aged twenty-three, had venereal complaints of long ſtanding, ſuch as ulcers of the throat, copper-coloured ſcabs and eruptions all over him, but particularly on his breaſt, ſhoulders, neck, and face, with nocturnal pains, &c. He was put on a courſe of acid nitrous, and recovered perfect health, in which ſtate he ſtill continues.

(Signed) A. BROWNE, Surgeon.

Royal Sovereign, off Uſhant,
October 21ſt, 1797.

In all the above caſes it appears mercury had previouſly been exhibited, but with little ſucceſs, and the ſymptoms had not yielded in the leaſt till the acid was uſed. The immediate return of appetite, and refreſhing ſleep, are ſtrongly exemplified in the firſt caſe. In the ſecond we obſerve that a relapſe was quickly checked and cured by the acid without mercury. The date of Dr. Browne's letter was near ſix months after the cures, and none of theſe men have complained ſince.

Some caſes in the ſummer of 1797 came under my own preſcription on board the hoſpital-ſhip, chiefly affected with cutaneous defædations, nodes of the ſhin bones, coryza, diſcharge of matter from the noſe, pains of the frontal bones, &c. Some of theſe men had taken mercury, but others denied having ever taken any. Yet they were all cured by nitric acid. The firſt effects of the medicine were, increaſe of appetite, profuſe perſpiration, and frequent deſire of voiding urine.

I attended, laſt winter, a poor woman in Portſmouth, labouring under the diſeaſe of four years ſtanding, and had been infected by a worthleſs huſband. She was much reduced and emaciated, had nodes on the tibia of both legs, and alſo on the metacarpal bones of both hands, attended with excruciating pain night and day. She had, previous to theſe ſymptoms, venereal eruptions, buboes, and a multitude of complaints; had frequently taken mercury to make her mouth a little ſore, but was never thought cured.

I ordered her the nitrous acid diluted, in ſuch quantity as ſhe could bear. In a week or ten days the nodes diſappeared, and alſo the pains. But in another week they returned rather worſe than before; the pains alſo equally ſevere: the medicine diſagreed with her, and I was obliged to give it up. She obtained no relief till the warm weather ſet in, when ſhe got ſtrength; and ſhe told me lately that ſhe had received ſome benefit from what ſhe was getting from her apothecary.

Some phyſicians and ſurgeons, I obſerve, continue to ſupport the character of this medicine; for my own part, what ſucceſs I have ſeen attend it, I am apt to think was very much owing to the previous exhibition of mercury. Yet there are certainly caſes on record that ſpeak ſtrongly in its favor; and from what we have ſeen, we cannot but hope that it may ſtill aid the uſe of mercury, and encourage us with the proſpect of finding, at laſt, ſome cures for venereal affections more mild in operation than any of thoſe we now employ.

Since my practice became more extenſive among officers from my ſtation in the navy, it is almoſt beyond belief the number of dyſpeptic patients that have conſulted me. Yet almoſt the whole are to be attributed to mercurial courſes often unguardedly begun, and continued from obſtinacy. It has been the faſhion with ſome to give mercury to officers in every doubtful complaint, as being ſuſpected venereal in its origin; and the ſtomach and inteſtines have been racked for months under this inconſiderate practice: palſy, and the moſt hideous train of what are uſually called nervous affections, have been the conſequence. Every medicine, therefore, that is introduced in the treatment of ſyphilis, by reſpectable authority, will deſervedly meet the grateful thanks of mankind; and not be haſtily abandoned, if it is likely to ſupercede the uſe of mercury.

I do not find now, among my medical acquaintance, many who are prepoſſeſſed in favor of the nitrous acid: what have been thought cures have generally broke out afreſh, and of neceſſity the old remedy was reſorted to. Some of Mr. Hammick's patients, whoſe caſes were publiſhed by Dr. Beddoes, have again ſuffered a return of the diſeaſe: two or three of this kind have been reported to me in the fleet, and they were ſuch, where a freſh infection could not be ſuſpected. They all yielded to mercury, in the uſual forms of preſcription.

MEDICINA NAUTICA.

MISCELLANEOUS COMMUNICATIONS AND REMARKS.

Sparſa collegit.

WASHING HAMOCKS.

SEAMEN's hamocks are uſually ſcrubbed with ſalt water; but they ought to be plunged into a tub of freſh water afterwards, to take the ſalt out; otherwiſe they will ſtrongly attract moiſture in damp weather, particularly on deck: this may produce catarrhs and rheumatiſm. A few tubs of water are ſufficient for a ſhip's company. This practice is recommended by Captain Theo. Jones, of the Defiance.

I have often wondered why hamocks are made of ſuch flimſy cloth; ſurely a thicker canvas would be preferable, more cleanly, and durable in foreign ſtations.

Ung. Antipſor.

℞ Pulv. ſal. armon. crud.
ſal. nitri, ā ʒſs.
Ol. ſuccini, gt. xx.
Sulph. viv. ʒij.
Arung. porcin. ft. ung.

This formula is recommended by Mr. Carruthers, a very old navy ſurgeon, who never ſaw it fail, which was not always the caſe with other ointments of ſulphur.

EXTRACTS *from a* LETTER *of Mr.* JOS. FLEMING, *dated St. Alban's, Halifax, July* 24, 1798.

" On the coaſt of Africa dyſentery was the moſt formidable diſeaſe I had to cope with, becoming a ſufferer myſelf, and reduced to extreme debility: my recovery was ſlow, and in ſight of a barren ſhore. After the neceſſary evacuations with antimon. tartar, and Epſom ſalt, I thought Dr. Moſeley's vitriolic ſolution a good tonic; but opium was the divine remedy. Your obſervation of ſtrangury in this complaint I experienced."

" I have ſeen in the ſouthern parts of America obſtinate intermittents cured by zinc. vitriol. when large quantities of bark had been uſed to no purpoſe; and often witneſſed the good effects of opium given at the firſt approach of the cold "fit of ague, as mentioned in your chapter on that "diſeaſe.

"I belonged to the Nemeſis when the Vengeance received the draught of men from her.—(*Vide* MED. NAUT. vol. i.) No wonder typhus "was introduced into that frigate: for two months "ſhe was employed between Sheerneſs and Spithead, carrying new-raiſed men, and ſometimes a "receiving-ſhip at the Nore; there were ſeldom leſs "than two hundred men on board beſides her "complement, moſt of them landmen very badly "clothed. Capt. Ball was particularly attentive to "their accommodation, in ordering the half-deck "and forecaſtle to be incloſed every evening with "tarpaulins, and ſails ſpread for ſleeping upon; "which ſails in the day were hung up between the "maſts, for the purpoſe of being aired in the daytime. Fires in hanging-ſtoves were alſo kept "burning below, to dry the decks: fumigations "with *devils* were alſo practiſed. No fever appeared in my time; but in February ſhe became "ſo ſickly, that her whole crew were ſent to Haſlar "Hoſpital."

REMARK.

The ſickly ſtate of the Nemeſis, as juſt mentioned by Mr. Fleming, was too much the caſe with other ſhips at the beginning of the war. The hurry and buſtle which take place at the early ſtage of all armaments have produced ſimilar diſaſters among new-levied men. While I was ſurgeon of the receiving-ſhip at Spithead in 1790, much evidence of this kind came under my obſervation; paſt misfortunes have not yet made us wiſer. Yet we ſhould think all occurrences of that ſort might be eaſily prevented by having large ſpacious ſhips for the purpoſe, ſuch as forty-fours and fifty-gun ſhips. But the landmen, who are commonly ill clothed and dirty, ought to be put into a kind of *recruits* uniform at once, and long clothes aboliſhed, their hair cut ſhort, and ſeamen might be appointed to initiate them into their habits, ſuch as learning them to fling their hamocks, and laſh them up, &c. This laſt faſhion was always a part of Capt. Duckworth's diſcipline, and by it the raw landman found himſelf as if among friends, and was accuſtomed to the different forms of his duty, ſo as to think himſelf at home.

T. T.

Mr. Watherſton, ſurgeon of the Superb, after being at ſea in Auguſt, found the meaſles in the ſhip; and, agreeable to his inſtructions, uſed the nitrous gas: but ſo irritating was it to the patient, that the ſmalleſt quantity produced violent coughing, and he wiſely left the infection to nature. The diſeaſe turned out to be mild, and extended to few, although there were fifty in the ſhip who never had meaſles.

Mr. Watherſton, in his letter of the 10th of February 1798, mentions the Egmont in the Downs receiving twenty-three ſeamen from the Bridgewater Eaſt-Indiaman, eighteen of whom labored under ſcurvy, and moſt of theſe in the very worſt condition. He adds, "The Bridgewater "ſuffered very much from ſcurvy, between Trincomale and the Cape of Good Hope, having, "during a paſſage of thirteen weeks and three "days, buried thirty-one men: ſome part of theſe "were invalids from the ſhips of war in India. "They were ſupplied with lemon-juice at the "Cape, but from a tedious paſſage of thirteen "weeks more from thence to England, during "which time they encountered much bad weather, ſcurvy again became general; their ſtock "of lemon-juice was ſoon expended, yet only one "man died. Their chief dependence afterwards "was bark and vinegar."

REMARK.

We are not a little ſurpriſed at Mr. Watherſton's information; for we thought that the ſhips of the Eaſt-India Company, ſince Dr. Clark's time, had been ſupplied with every article in abundance to counteract ſcurvy, or cure it when it broke out. Thirty-one men buried from ſcurvy in a ſingle Eaſt-Indiaman, during a paſſage to the Cape! The account is horrible. This is an expenditure of Britiſh ſeamen not to be endured. Let it be known to that affluent Company, that lemon-juice, prepared for the uſe of the navy, can be preſerved in perfection for three years, and that the lives of theſe thirty-one men might have been ſaved for thirty-one ſhillings. I am at a loſs to know under what medical juriſdiction theſe ſhips are fitted; but we bluſh to read ſuch narratives at a time when the prevention and cure of ſcurvy are ſo well underſtood.

T. T.

Mr. Landleſs, ſurgeon of L'Unité, in his letter of the 25th of November, informs me that the ſhip lately put into a ſmall port of Norway, where he found ſome people belonging to his Majeſty's ſhip Hound, who had been ſent on ſhore for a contagious fever. They were attended by a Dutch barber-ſurgeon, who was adminiſtering ſugar and water, with refrigerants, and waiting with vaſt anxiety for a *criſis!* The Engliſh ſurgeon, not poſſeſſing the patient deliberation of the Dutchman's pathology, took his countrymen under his care, reſtored them with Engliſh fare, nouriſhment and good wine, and ſet them on their legs in two or three days, to the no ſmall ſurpriſe of the inhabitants, but with what their former attendant thought would terminate their exiſtence.

◆

THEORY OF SCURVY,

By Mr. R. Fairfoul, Surgeon, *Cleopatra.*

Dr. Trotter, in his elegant Theory, built on the diſcoveries of the French chemiſts, has taught us the principle in recent vegetable matter that cures the ſea-ſcurvy. It is certainly oxygene which effects the change; I only wiſh to extend his theory.

It is an old opinion that an alkali contained in the fluids is the cauſe of ſcurvy. The blood of people in health is known to contain ammoniacal carbonate, calcarious phoſphate, and muriate of ſoda; and this laſt only in proportion to the quantity uſed for culinary purpoſes. Beſide theſe, the blood muſt contain a naked alkali, from its property of changing vegetable blue colours to green, and this is either ſoda or ammoniac. In the blood of ſcorbutics this change alſo takes place; but it has not been determined whether the proportion of alkali is increaſed.

The freſh urine of people ſuppoſed to be in health changes vegetable blue colours to red: the urine of ſcorbutics has, in my experiments, changed them to green; and in ſick berths, when the buckets have been allowed to remain too long uncleaned, the ſmell of ammoniac becomes intolerable. This decompoſition alſo takes place in the urine of healthy people; but I fancy, by no means ſo quickly, nor to ſuch extent. Ammoniac may be taken into the ſyſtem from the uſe of putrid proviſions: and the continued uſe of the fixed alkalis and lime is well known to bring on a diſeaſe very ſimilar to ſcurvy; and they may produce this effect, by ſeparating the ammoniac from the acids, and by that means forming other ſalts, as phoſphate of ſoda, phoſphate of lime, &c. ſome of which are found in the blood, and all in the urine.

Freſh vegetables, and acids, particularly thoſe of the vegetable kingdom, are allowed by all to be the beſt means of curing the ſea-ſcurvy. Theſe are the ſubſtances which afford the principle neceſſary for the cure of that diſeaſe; but neither the citric, malic, or acetic acid, will ever be found to exiſt in the fluids. They are decompoſed, either before they enter the ſyſtem, or immediately after; and this is probably effected by the acidifiable principle of the acid entering into union with a ſubſtance prepared in, or ſeparated by ſome organ of the body; and thus forming the phoſphoric acid, which now unites with the ammoniac, renders it unhurtful to the ſyſtem, and perhaps throws it off.

It is well known that the ſoft parts of the body, the fluids as well as the bones, contain a great quantity of phoſphoric acid; and though this acid has been found in both vegetable and mineral kingdoms, yet it probably is originally the product of the animal kingdom. Phoſphorus is a ſubſtance which is continually preparing in the animal body; and the atmoſphere, aſſiſted by recent vegetable matter, and by ſome medicines affords oxygene, or the principle neceſſary to convert it to an acid.

It is from theſe conſiderations that I would propoſe the phoſphoric acid for the cure of ſcurvy; and think that, by giving an *animal acid* ready-formed, it will leſs require the powers of digeſtion and aſſimilation, which in ſcorbutics are much impaired; indeed, all the cauſes of ſcurvy probably act by diminiſhing theſe powers.

A French chemiſt has obſerved, that very little phoſphoric acid is to be found in the blood of gouty people, and ſuppoſes that the acid is not thrown off by urine, but is conveyed to the joints, where it occaſions the diſeaſe. I would differ from him in his concluſion, and am rather inclined to think that the powers which produce the phoſphoric acid are ſo much debilitated that they cannot produce a ſufficient quantity to counteract the bad effects of the calcareous earth, which we are continually taking in with our nouriſhment.

There are many objections to the above theory; but I think it ſufficient to warrant a trial of the phoſphoric acid.

SCURVY.

Dr. Browne, of the Royal Sovereign, while uſing the nitrous acid for curing the lues venerea, obſerved the ſymptoms of ſcurvy to ſupervene exactly as we have often ſeen them during a courſe of mercury. They advanced ſo quickly, that he was under the neceſſity of adminiſtering lemon juice, till the ſcurvy diſappeared; the cure of ſyphilis was afterwards completed by the nitrous acid.

In Dr. Rollo's work on Diabetes, we obſerve an account of a general ſcurvy appearing among the convicts on board the hulks at Woolwich, during the ſevere winter in April 1795. This was the time the Channel Fleet ſuffered ſo ſeverely; and the cauſes producing it in both inſtances appear to have been very much alike. The convicts had no freſh vegetables from the 12th of October 1794, to the 24th of April 1795. The ſcurvy was firſt obſerved about the 13th of April, and was ſoon cured by recent vegetables, ſo as to be unknown in July. Their diet conſiſted of boiled barley or oatmeal porridge for breakfaſt and ſupper; broth of ox-cheeks and ſhins of beef, with a portion of the meat, for dinner; a proper allowance of bread, and three pints of ſmall-beer daily. The preceding winter was uncommonly ſevere, with much froſt, which deſtroyed all eſculent vegetables.

DYSENTERY.

It would ſeem that this diſeaſe is very much connected with the ſtate of the atmoſphere, probably as affecting the condition of the ſurface of our bodies; and often appearing after ſudden tranſitions from warm to cold weather. A ſquadron under the command of Rear-Admiral Man arrived in England about the end of December 1796, after a paſſage of eleven weeks from Gibraltar. The wind during this time was moſtly to the Northward of Eaſt, and intenſely cold. Previous to the paſſage the ſhips had been for many months employed in blocking up a French ſquadron under Admiral Richery in Cadiz. The inſipid duty of a blockade, if I may uſe the expreſſion, tends more than ſevere labour to exhauſt both officers and men. The dull routine of ſervice, the ſame objects conſtantly in view, with occaſional ſignals to tack or wear, are all the variety that it affords; thus the ſpirits of a ſhip's company ſink into liſtleſſneſs and inactivity, and hence the prediſpoſing cauſe to peculiar diſeaſes. The Defence was the chief ſufferer at this time, from a fever attended with ſingular ſymptoms, and a great mortality. But though numbers periſhed, a third of the ſhip's company were only ſaved by Captain Wells giving up all his private ſtock of choice and delicious wines, with other neceſſaries, for their uſe. Some of theſe ſhips were much afflicted with ſcurvy and dyſentery. The

Cumberland came to Spithead, having loſt eleven men in the paſſage, and landed forty at Haſlar, very debilitated, in dyſentery, large ulcers, ſcurvy, &c. The ſurgeons of this ſquadron remarked that their people ſuffered exceedingly in the Channel from their thin and worn-out clothing, moſt of the ſhips having been ſome time abroad. This, I believe, is a common obſervation in all ſhips coming from warm countries in the winter ſeaſon: we wiſh ſome general regulation to be made on this head: warm and thick ſlops might be kept in the ſtores abroad, and iſſued to the ſhips when they are ordered home. It is not to be expected that ſeamen, thoughtleſs and improvident, will ever attend to this circumſtance themſelves.

TYPHUS.

In the memorable retreat of the ſquadron under Vice-Admiral Cornwallis from the French fleet, on the 19th of June 1795, a ſeaman in one of the ſhips, convaleſcent from typhus, was in his weak ſtate ſo overcome by fear, that he quickly relapſed. His fever afterwards was remarkable for violent nervous affections; and he died in a few days, dreadfully convulſed.

EXTRACTS *from a MS. intitled* "NAUTICAL REMARKS,"

By Mr. ALEX. REID, Surgeon in the Royal Navy.

As part of ſea-diet he recommends the peaſe to be deprived of their huſks by a mill, previous to boiling; and adduces ſome caſes of violent cholic, cauſed by eating pea-ſoup as now uſed in ſhips. Theſe affections are liable to happen with perſons of weak and dyſpeptic conſtitutions; and for theſe reaſons numbers of men never taſte the ſoup. He found zinc. vitriol. ℈i given immediately, ſo as to excite vomiting, remove the diſeaſe. He adds, that he knew a young lady in Scotland, who had nearly periſhed by eating raw green peas, and drinking after them a glaſs of new ale. This lady was relieved by rolling her to and fro, which had the effect of removing the flatulency.

Mr. Reid approves much of my opinion of dancing, and providing a band of muſic in every ſhip: he hopes the arguments I have employed will be duly attended to by every one who regards the comfort and health of ſeamen.

He recommends a certain number of fiſhermen's boots to be ſupplied to each ſhip, to be worn by the people who waſh decks in a cold morning. But he cautions every officer againſt waſhing decks in the winter months; they had better ſcrape the nails up. He has known many obſtinate intermittents begin during this period of duty, and ſevere headachs, from the head and feet being long expoſed to different degrees of heat. This practice is now unknown in well-ordered ſhips; and the diſeaſes which it produced are alſo on the decline.

He obſerves that great pains are often taken to pump out *foul air* from the holds of ſhips; but the ſame exertions are not made to throw *freſh air* in. Windſails, in bad weather, cannot be employed: he therefore recommends ſome machine to be conſtructed, like the common bellows, on a large ſcale, with long leathern tubes, to direct the air occaſionally into any place below it may be wiſhed to ventilate. Some plan of this kind would certainly be highly advantageous.

Mr. Reid was a pupil and inmate of the celebrated Dr. John Brown of Edinburgh. Every perſon in the houſe was in the habit of taking laudanum in great quantities. The ſervant-maid one night, in the dark, miſtook a bottle of the laudanum for brandy or whiſky, and drank a great deal of it. The alarm was immediately given to the ſtudents; ſhe was found ſtupid, and black in the face. Mr. Reid opened a vein, and ſhe recovered: he alſo gave her vol. ſpirits, &c.

Mr. Reid was aſſiſtant to the Naval Hoſpital at Villa Franca, in 1783. The hoſpital ſtood on a peninſula. There were a number of bad ulcers ſent from the ſhips on ſhore; but notwithſtanding the patients had abundance of freſh proviſions and fruit, the ulcers were obſtinate, and ſeldom healed. The inhabitants of the place ſaid it was the ſame caſe with themſelves; they attributed the difficulty of cure to the ſea-air, for they always moved up the country for the cure of ſores, and they found that to anſwer. Could any practical inference be drawn from this fact in the treatment of our malignant ulcer?

Since the eſtabliſhment of a regular ſupply of vegetables in 1795 to the ſhips, on returning to port the neceſſity which at firſt produced it is in a meaſure done away. The ſeamen themſelves have inſenſibly imitated the practice; and it is common now in moſt ſhips for the men to carry to ſea, at their own expence, a quantity ſufficient for a long cruize. Something ſimilar to this occurred after the change of ſick neceſſaries in 1794; and from that time tea, or herbs with ſugar, have been hoarded up, equal to a four months' expenditure, in the different meſſes. The good effects which muſt follow a cuſtom of this ſort is not merely a preſervation of health; it encourages induſtry and a care of their money; by which means they are diverted from the indulgence of ſpirituous liquors. We earneſtly recommend all officers to countenance this practice,

tice, and to mention it to their people on receiving pay or prize-money.

A number of marines having ſuffered much from the cold in ſevere froſts, while ſtanding as ſentinels on the poop, gangway, and forecaſtle, we would recommend the practice of changing the men every hour; even although double the uſual number ſhould be kept out of bed for the purpoſe.

Some of our correſpondents ſtill regret that ſoap has never yet been iſſued by authority, through the purſers. We think it would be a great piece of economy to ſupply ſeamen with that kind of ſoap for waſhing that *lathers* with ſalt water. The Portugueze make a ſoap of this kind on the coaſt of Africa; but it might be done in England: it depends on a larger portion of alkali, which adds a little to the price. This practice would ſave freſh water; and it muſt always be deemed a ſevere reſtriction when the people are not allowed water for waſhing: on many occaſions it would be preferable to deny them drink, rather than prevent regular cleanlineſs.

* * *

MEDICINA NAUTICA.

DIET.

Utile Dulci.

THIS branch of medicine is of the firſt importance, and we are glad to ſee it engage the attention of officers and ſurgeons more than in former times. The ſtate of a ſick perſon confined to bed in a ſick berth on board a ſhip, can be better underſtood than expreſſed, and muſt naturally excite the ſympathy of every one who has experienced ſickneſs at ſea. The ſurgeon's neceſſaries afford tea, cocoa, rice, ſugar, and ſhip's wine, which, with portable ſoup and barley, and flour lately ordered for bread, conſtitute the diet of a ſick berth. Theſe articles are all very well in their way, but they make but a ſmall proportion of the good things of life, and are poor ſubſtitutes for an hoſpital fare, accommodated to the taſte, deſires, and appetites of patients weakened and reduced by diſeaſe. We firmly believe if one half of the money expended on cheſts of medicine were laid out in the comforts of diet, much real advantage would be gained. Medicines judiciouſly preſcribed and duly adminiſtered, muſt contribute their full ſhare in the recovery of health; but it ought to be remembered that they have but a ſhare in the buſineſs, and their uſe is often loſt, or at beſt doubtful, if a correſponding diet does not accompany them. I have ſeen ſo much done by a few delicacies from the tables of officers, that I ſhall never ceaſe to recommend improvements in this department. The charity of theſe gentlemen is not in need of my eulogies, it will be regiſtered elſewhere. When I ſee a laviſh exhibition of medical articles, without a food grateful, nouriſhing, and cordial, in debilitated conditions, it reminds me of the ſcripture alluſion, " *I aſked for bread,* " *and you gave me a ſtone.*"

I ſhall, therefore, make no apologies for laying before my readers ſome extracts from a ſmall work called the " Seaman's Guide," by the Honorable John Cochrane: in which philoſophy has been commendably employed in giving directions how to live comfortably at ſea. I am the more induced to do this, as it may tempt many to peruſe the whole pamphlet. We begin with the ſtaff of life,

"BREAD.

" The proceſs of making yeaſt, as practiſed at " Edinburgh, is as follows:

" Take two ounces of hops; boil them for an " hour in two gallons of water; and, boiling

" hot, ſcald eight or ten pounds of flour, and " ſtir it very well into a paſte. Do this about " eleven in the forenoon. Let it ſtand till ſix " o'clock in the evening; then add about a quart " of yeaſt to forward the fermentation, and mix " it well together. Next morning add about as " much more flour and water ſufficient to make " it into dough; and in the afternoon it will be " fit for ſetting ſpunge and baking. Reſerve al- " ways a piece of the old dough to mix with the " new batch, inſtead of the yeaſt; which is ne- " ceſſary only the firſt time, to haſten the proceſs. " The above quantity of hops will ſuffice for an " hundred and twenty quartern loaves.

" This proceſs in Scotland requires about thirty " hours; in a warm climate a few hours would ſuf- " fice; as fermentation there advances with great " rapidity. A due attention muſt be paid to that " circumſtance, as every thing depends upon it."

" *How to uſe the dough.*

" Take a piece of dough and keep it for uſe. " It will keep for ſeveral days very well. Mix the " dough with ſome warm water, not very hot, " and knead it up with ſome flour, to ferment " and ſpunge. Divide the flour into four parts: " mix a quarter of the flour with the leaven, and " a ſufficient quantity of water to make it into " dough, and knead it well. Let this remain " until it ferments and riſes properly; then dilute " it with more water, and add another quarter of

" the flour, and let it remain to riſe. Do the
" ſame with the other two quarters of the flour,
" one quarter after the other, taking particular
" care never to mix more flour until the laſt has
" riſen properly. When finiſhed, divide it into
" loaves; and let the loaves remain to riſe, in
" order to overcome the preſſure of the hand in
" forming them; then put them into the oven,
" and reſerve a piece of dough for the next
" baking. Dough thus kept, might, with proper
" care, be prevented from going into the acetous
" fermentation, by mixing, from time to time,
" freſh flour. This practice is particularly re-
" commended to be followed by thoſe perſons
" who do not like any *acidity* in their bread, or
" have an equal diſlike to the bitter ariſing from
" hops. On board a ſhip, this mode may be
" eaſily practiſed, as, from the regularity of keep-
" ing watch, the time for mixing the flour can be
" adhered to with great exactneſs. From an igno-
" rance in the art of baking with leaven, very few
" ſhips attempt even to bake rolls for the officers,
" and fewer ſtill for the ſhip's company."

The above extracts are ſo plain, that nobody can miſunderſtand the directions given. The ſurgeon, therefore, by purchaſing a quart of yeaſt when he goes firſt to ſea, to begin the fermentation of the leaven, may order the proceſs to be continued daily ſo as to afford rolls for any number of ſick; and we earneſtly recommend this practice.

The leaven here directed alſo poſſeſſes the quality of raiſing the *flour pudding*, and making it light and eaſy of digeſtion. Half the quantity of leaven ordered above will ſerve the whole puddings uſed at one meal for ſix hundred men, which is the complement of a ſeventy-four-gun ſhip.

" BEER.

" To every quart of porter or ſtrong ale, add
" two quarts of water, moderately warm. To
" every quart of this mixture, add a table-ſpoon-
" full of brown ſugar, or a wine-glaſs-full of ſyrup
" or molaſſes. Put the whole into a tub; beat
" and whiſk it with a bundle of rods for at leaſt
" half an hour; bottle and cork it, and tie the
" corks down with ſtrings. The preſſure of the
" corks upon the ſtrings will ſhow the progreſs of
" fermentation, which will be ſlow or quick in
" proportion to the warmth of the weather. In
" the Eaſt or Weſt Indies, fermentation is ſo quick,
" that what is made in the evening is ripe next
" day. When once made, always preſerve a bot-
" tle or two of the old, and mix it with the new
" making, as it quickens the fermentation, and
" makes it more briſk and lively. The quantity
" made muſt be, in warm climates, in proportion
" to the daily conſumption, as it ſpeedily turns
" ſour. If this ſmall beer is wanted in large quan-
" tities, it may be made in caſks, in the ſame man-
" ner as ſpruce beer: but do not draw it entirely
" off; always reſerve a proportion of the old to
" mix with the new. The ale to be taken to ſea
" for the purpoſe of making this beverage, ought

"to be made very ſtrong; but by no means to be "reduced to an extract, or ſuch a ſubſtance by "boiling, as will evaporate the vinous and active "part of the malt liquor. Good ſtrong ale, that "will bear thrice its quantity of water, will be "ſufficient."

We thus have, by the plan of the honorable author, a ſmall beer that can be made in any climate, and its value to the ſick in warm countries is beyond rubies. Officers, whoſe fortunes enable them to beſtow comforts on the ſick, would do well to provide ſome dozens of ſtrong-bodied ale for that purpoſe, which can be manufactured under the eye of the ſurgeon when there is occaſion for it. Mr. Cochrane alſo recommends the grog to be made into *punch* with brown ſugar, which, when bottled and kept a little while, undergoes a ſlight fermentation, and becomes briſk and wonderfully grateful. Our ſurgeons, being now well provided with lemon-juice and ſugar, can prepare *punch* in this manner without any expence; as the purſer would charge the ſpirit to the ſick that uſe it.

"MINCED COLLOPS.

"In ſhort cruizes the following mode of pre"ſerving beef is recommended. Take beef, and "chop and mince it very ſmall; to which add "ſome ſalt and pepper. Put this in its raw ſtate "into ſmall jars, and pour on the top of it ſome "clarified butter. When intended for uſe, put "the clarified butter into a frying-pan, and ſlice "ſome onions into the pan, and fry them. Add "a little water to it, and then put in the minced "meat: ſtew it well, and in a few minutes it will "be fit to ſerve up. This is a favorite diſh in "Scotland. Few families are without it, as it "keeps well, and is always ready as an extra "diſh."

"To render pea-ſoup or barley-broth pleaſant "and palatable, fry onions in butter, and pour "into the ſoup."

"There is a practice now in uſe on board of "the American whalers, who are generally out "ten or twelve months in a voyage, that deſerves "to be mentioned. They take cyder on board "in caſks, into which they put a quantity of "ſound apples. The apples are thus kept in "high preſervation; and as they draw off the "cyder, the apples are given to the men, to be "either eat raw, or made into puddings."

In our former volume we mentioned that apples had been diſtributed to a ſquadron of ſhips of the line, where the ſeamen were overrun with ſcurvy. The demand for lemons had, that year, been ſo great, that we employed the apples: but the method now mentioned by Mr. Cochrane for preſerving them, muſt be highly uſeful in long voyages: they are, beſides, grateful as a change from lemon-juice. We cannot take leave of Mr. Cochrane without returning him our warmeſt thanks for what he has provided for the comforts of a ſea life; and he may reſt aſſured our authority will not be wanting to ſerve up his diſhes to the inhabitants of the ſick berth.

As it is my duty, from being at the head of the medical department of the fleet, to receive every hint for improvement in the treatment and comfort of the ſick, and to direct the ſame to be uſed whenever it can be practiſed with advantage, I ſhall lay before my readers a letter from a female correſpondent, whoſe good ſenſe has well qualified her for what ſhe writes upon.

MELROE's SOUP.

"SIR, London, Jan. 29th, 1798.

"I have hit upon a method of making cheap ſoups, and other diſhes ſuitable to the neceſſity of the times. One or two of the ſoups will be proper, I flatter myſelf, in the navy and other departments; I have, therefore, taken the liberty to addreſs you on the ſubject, and communicate the method of making the ſoup, wiſhing you will have the goodneſs to make a trial of it; firſt in the officers' meſſes, and then in the ſeamen's.

“ By the experiments which I have made on animal diet, I have found that fat is the eſſence of meat, or nearly ſo: my “ Cookery” is founded on this, as will appear from the recipe:

Take beef ſuet, four ounces.
Scotch barley, lbſs.
Oatmeal or flour, 3 or 4 ounces.
Onions, 3 or four ounces, or
Leekſeed, a ſmall quantity.
Celery-ſeed, a ſmall quantity.
Salt and pepper, a ſufficient quantity.
Water, a gallon.

“ The barley is to be boiled in the uſual way, about an hour before the ſoup is removed from the fire; add the oatmeal or flour previouſly mixed in a little cold water. The ſuet had better be melted before the fire, and added fifteen minutes, along with the onions, celery-ſeed, &c. in a bruiſed ſtate, previouſly to the cookery being finiſhed.

“ The value of the above will be found to be about 4 d. a gallon, ſufficient for eight men: if a cake and a quarter of portable ſoup is added, the value will be 10 d. If you ſuppoſe my cookery to be unwholeſome from the ſuet contained in it, then, by the ſame chain of reaſoning, the ſeamen's pudding muſt be unwholeſome, when eight men eat double the quantity of it, viz. ½lb. to 3½ of flour, if I miſtake not.

“ The fat combined with mucilage, as in the barley-broth, forms a mixture eaſily digeſtible, and, I think, highly nutritious. But I am open to conviction; if you can make it appear otherwiſe, by any chemical or phyſical reaſon, I will be glad to be informed. The ſoup is pleaſantly taſted; but being a new-fangled meſs, objections may be made, and an unfounded prejudice held againſt it. But at ſea I can venture to predict, when nothing but *ſalt junk* is the order of the day, and ſhould the day be cold, a pint of this ſoup will be a grateful meal to a ſea-faring man. I am, Sir,

"Your moſt obedient ſervant,

(Signed) "ELIZA MELROE.

"To Dr. TROTTER."

I have had ſeveral meſſes of this ſoup made at my lodgings in Portſmouth; but I think it ought to have twice or thrice the quantity of ſuet and vegetables, which renders it very palatable indeed. The principles here laid down are very juſt: we know, from the experiments of ſome ingenious phyſicians, that the fat of meat is by far the moſt nouriſhing part; and ſevere labour can be better ſuſtained by living upon it than on the lean portion. The flour or oatmeal and barley ſerve to combine or make it miſcible in the water, and thus reduce it to an animal jelly or mucilage, while the vegetables impart their qualities, and render it antiſcorbutic. We think this meſs to be a great improvement in ſea-diet; had the hoſpital-ſhip remained in the fleet, it would have been introduced into our bill of fare, as infinitely preferable to the unpleaſant gluey portable broth now in uſe throughout the Navy; which is alſo very coſtly and not much nutritious.

Since receiving the above letter, I have peruſed a book of cookery by this lady, where the ſame idea is extended into a cheap and eaſy ſyſtem for houſekeeping. Such a book will be highly acceptable to myſelf, and all half-pay officers, when our country no longer may require our ſervices: the ſailor ſays, that "the King's guinea goes farther than any other maſter's;" but in thoſe days we ſhall have only half the preſent number *.

WATER.

We cannot leave the dietetic part of our work, without adding ſome remarks on Water. We were employed the whole ſummer of 1792 in making experiments on the beſt method of preſerving water pure and ſweet in long voyages; and a ſummary of theſe is publiſhed in a little work called "Medical and Chemical Eſſays," printed by Jordan, Fleet-ſtreet, for Mr. Moubray of Portſmouth, to whom I preſented the copy at the time his printing-office and materials were burnt down in December 1794.

We found, after trying every thing, that the beſt practical method was gently *charring* the caſks in putting them together, both ſtaves and heads, which rendered the ſurface unfit to decompoſe the water. But ſo little was this practice deemed perfect before by the Victualling Board, that Mr. Reeks, the cooper at Weevil, ſhowed me an order from the Commiſſioners, expreſsly forbidding it; as they ſaid it blackened the fluid. It moreover makes the caſks laſt longer, by hardening them againſt worms in warm countries, and alſo leſs apt to ſhrink from the hoops. The whole proceſs is defended on chemical principles in the above work, and no man has dared to ſay they are wrong.

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* "An Economical and New Method of Cookery; a Saving of 30 per Cent. in Houſekeeping." By E. Melroe. London. Longman, Paternoſter-row. 1798.

I have repeated this ſubject, becauſe we had much bad water in the fleet laſt ſummer: I now, in the name of the ſervice, requeſt ſome Captain will take the buſineſs up, and carry to ſea a given number of caſks filled with pure water, one half charred according to our plan, and the other half in the common way. Some truſty perſon muſt ſuperintend the duty, that it may be fairly tried, for we know it muſt ſucceed.

BEER.

We have always been advocates for ſome change here; but we have been diſappointed hitherto. We have, however, overcome ſo many bad forms, that we muſt perſevere ſtill. Our plan is, that two quarts of beer ſhould be ſerved out at twice, that ſhall contain the ſame proportion of malt as four of the preſent, but more hops, to make it keep. Beſides the baneful effects of grog to health, the ſeamen have a practice of hoarding it up, that they may have a jolly drinking, as they term it;

and I am ſorry to add, this has given birth to much of their outrageous proceedings: for the unguarded character has thus been decoyed, and made an aſſociate in plots by the deſigning and unprincipled villain. This kind of beer is only intended for ſea-uſe.

MEDICINA NAUTICA.

MALIGNANT ULCER.

IN the ſpring of 1797, I was informed by Mr. Caird, ſurgeon of the Queen Charlotte, that a number of their people were afflicted with ulcers of a moſt obſtinate nature, and not yielding to the uſual remedies either general or local. He was under the neceſſity of ſending many of them on ſhore to the hoſpital, where a change of ſituation did not ſeem to operate much in their favour. In this ſtate his ſick liſt continued for ſome weeks; and as the weather became milder in temperature, he did not obſerve any diſpoſition for the better in the condition of the ſores, which now increaſed in number. Several men that had been bled for different inflammatory diſeaſes, ſuch as catarrhs, ſore throats, &c. complained that the orifice in their arms did not heal kindly, but became painful, ſomewhat ſwelled, hard, of a livid red colour, and which excited ſtrong ſuſpicions, that the wound had been made by a foul lancet, that had been employed for other purpoſes, ſuch as opening abſceſſes, that could communicate infection. This opinion, however, was ſoon given up; for other lancets, known to be in perfect order, and uſed by different mates, did not prevent ſimilar appearances in other patients. Mr. Caird had at one time ſo many as twelve of this deſcription in his liſt; in one of whom the affected part ſwelled and inflamed rapidly, ulcerated, and ſpread, till it aſſumed ſo bad an appearance, that he was ſent on board the Meduſa hoſpital-ſhip, about the beginning of May, while the fleet lay at St. Helen's.

The patient was a ſtrong, healthy young man, and a ſeaman ſtationed in the maintop. The wound that was originally made with the lancet was now an ulcer of the ſize of a crown-piece, covered with a ſloughy matter, black and fetid: the edges of the ſore were ragged, and for a conſiderable ſpace round, hard, and livid; but a degree of ſhining redneſs extended much farther, with tumefaction both above and below the ulcerated part. The pain was excruciating, extending downwards to the ends of the fingers, and up to the ſhoulder and arm-pit. The lymphatics leading to the axilla could be diſtinctly felt, but the glands above were not enlarged. Violent rigours accompanied this condition of the ſore, reſembling the cold ſtage of an intermittent, alternated with heats and ſweating, but not producing a ſolution of the fever: thirſt, ſickneſs, and vomiting, were alſo concomitants. The eyes and countenance were fluſhed, ſevere headachs, and not without ſlight delirium at times; the pulſe, though frequent and full, was by no means hard. He was not bled, as the accident was cauſed by that operation; but he took briſk purges of *calomel* and jalap, in order to bring him down. The applications to the arm were fomentations and emollient poultices. Such was the treatment of the ulcer during the time the fever and inflammation ſubſiſted; and poultices were continued till the ſloughs ſeparated, with which the febrile indiſpoſition diſappeared. After this the ſurface of the ſore looked clear and florid. A conſiderable hæmorrhage took place from one of the veins being eroded, but was ſoon reſtrained by gentle compreſſion below the ulcerated part, and did not return.

This ulcer ſometimes yielded ſo little pus, that it was difficult to remove the dreſſings; and whenever it ſeemed diſpoſed to aſſume this condition, we made free with ſtimulating ingredients, either ſprinkled over the ſurface or mixed in the ointment, the chief of which were hydrar. nitrat. or ærug. æris. The patient often complained of pain in the affected part; and there was always a neceſſity for a large doſe of tinct. opii. at bedtime. This pain, when violent, always forboded ſome change in the complexion of the ſore, that indicated the application of the metallic ſalts. He alſo took bark at this time. After the fever ſubſided, it was ſurpriſing to obſerve the great debility that followed, and a degree of emaciation that could ſcarcely have been expected. But as the appetite returned the ſtrength was quickly recruited, by a diet at once delicate and nouriſhing, and which afforded plenty of variety, ſo that the ſtomach was never palled with a repetition of the ſame kind of food. In ſix weeks from the time he left the Queen Charlotte, the ulcer ſcarcely needed a pledget, when he was ſent on ſhore to the Hoſpital with others. He was afterwards invalided, from the ſtiffneſs and contraction that remained at the elbow.

It is to be remarked that the Queen Charlotte had, previous to the appearance of this ulcer, been long in harbour, where the men were living on freſh beef every day with abundance of vegetables; and all the ſubjects of ulcer were in the prime of life.

The fleet went to ſea about the middle of May, and in a very ſhort ſpace after, other caſes of ulcer, with the ſame general character, appeared on board the Queen Charlotte, and were ſent to the hoſpital-ſhip. Some of theſe began from ſlight ſcratches and bruiſes; but in violence of ſymptoms, and the great extent of ſurface which the ſore occupied in a few days, were infinitely beyond that deſcribed above. In the beginning of May the weather was rather cold for the ſeaſon, but towards the end of the month it was warm.

When I viſited the fleet at St. Helen's, there were ſome bad caſes of ulcer in the Royal Sovereign and Terrible, but nothing unuſual was taken notice of in the appearance they put on; nor had they yet ſhown the leaſt tendency to become malignant.

On the 10th of June the objects for hoſpitals in the different ſhips were, by ſignal, ſent on board the Meduſa to be carried to port, which increaſed our number to ſixty-five, the greater part of whom were ulcers, and evidently of a peculiar kind. The Saturn alſo ſent ſome bad caſes.

While theſe men remained in the hoſpital-ſhip, the treatment varied little from what has been mentioned above: cold applications were ſometimes ſubſtituted for the fomentations, while the inflammation laſted, and ſeemed to anſwer better. Much advantage was gained by frequently changing the dreſſings, as the diſcharge in the ſloughing ſtage was profuſe and very fetid. In all our hoſpital practice, we never beheld ſo many ulcers together, that had, in ſo ſhort a ſpace, extended over the whole limb, whether leg or arm, with a loſs of muſcular fleſh great beyond example, and leaving the bone quite bare almoſt the whole length. Some of the Royal Sovereign's people were affected in the back and ſhoulder, where bliſters had been applied that ſoon degenerated into this foul, fetid, and malignant ſtate of ulceration. Even the ſcalp was not ſecure againſt this diſpoſition of wounded parts.

After the fever ſubſided, and the firſt ſloughs fell off, and the ſurface appeared tolerably healthy and florid, our hopes of the ſore going no deeper were ſometimes diſappointed. Little florid granulations, reſembling ſmall ſtrawberries, and not unlike the healthy proceſs of nature in a well-conditioned ſore, would frequently appear over the whole ſurface, or on particular parts, but ſcarcely poured out any matter. Theſe would ſometimes diſappear before the next dreſſing, ſeemingly by abſorption, after which the tendon or bone beneath would be left entirely bare. The ſore at this time had not the leaſt fætor. In thoſe caſes where a large portion of integuments and muſcle had ſpacelated, the ſtrength of the patient ſunk inconceivably faſt, and extreme emaciation in the courſe of a few days was the conſequence. Our wine was of the beſt quality, and when deſired, was allowed in due quantity: but we were alſo well ſtored with fine bottled cyder and London porter. Theſe articles ſeemed to ſnatch ſome of them from the very verge of diſſolution, and they were occaſionally changed for punch made from the freſh lemon. We had, at the ſame time, abundance of oranges, and eggs cooked in various forms of pudding. Theſe caſes were landed at the hoſpital; ſome terminated fatally, and a few amputations took place, but other particulars I have not been able to learn.

Amidſt this groupe of miſery, the ſtate of a man from the Saturn was ſingularly ſhocking. He juſtly blamed his own indiſcretion, and thus deſcribed his diſeaſe: He had, while in port, contracted a virulent gonorrhœa; but no uncommon ſymptoms attended, till he returned on ſhore with leave for a few days. He drank to the quantity of a bottle of raw ſpirit in the ſpace of a few hours; the effects of which were next morning apparent in the inflamed ſtate of the urethra, and parts adjacent. The glans penis ſwelled rapidly, and a paraphymoſis was formed that produced extreme pain: the urine flowed only in drops, and added to his torment. He had alſo an acute fever, and tranſient delirium from the pain. It was in vain that Mr. Seeds employed the full force of the antiphlogiſtic regimen, ſuch as profuſe bleeding, quick purges, fomentations, and plentiful dilution. The ſymptoms advanced by too haſty ſtrides to be arreſted by any reſources of medical ſkill. The gland of the penis ſoon dropped off: but the miſery of the patient did not ſtop there; the whole body of the penis paſſed quickly through the ſtages of exceſſive excitement and inflammation, to complete gangrene and mortification, and ſeparated at its very crura. The whole length of the urethra to the bulb ſloughed away, and alſo the ſcrotum, leaving the teſtes aad ſpermatic veſſels barely covered with cellular ſubſtance. He died.

Caſes of this kind have been frequent in ſhips, from the inordinate ſtimulus of vinous ſpirit: but there was reaſon to believe, that in the preſent inſtance there was a diſpoſition in the body to malignant ulceration, but certainly aggravated by the quantity of ſpirit taken into the ſtomach, which from its undiluted form, was more likely to induce inſtantaneous inflammation: the complexion of the parts alſo confirmed this ſuppoſition, and it is to be remembered that the patient came from a ſhip that had the malignant ulcer on board.

In bliſtered parts, which aſſumed the characteriſtic appearance of this prevailing malady, there were particular ſpots that, inflamed, became dark-coloured and ſloughy, which ſpread in all directions, till the whole extent of the bliſter was ulcerated. Numerous little veſicles appeared on the margin, to a conſiderable diſtance, with inflamed edges: theſe quickly broke, turning of a dark red colour, in ſome places united with the large ſore, and gave the whole an indented appearance ſomewhat reſembling peninſulas in a ſea chart. The veſicles appeared to be lymphatics inflamed by the abſorption of the cantharides, which inſtantly partook of the general diſpoſition to gangrene. During the whole of this proceſs, an acute and violent degree of fever raged, with unuſual pain of the affected part, which continued till the inflammation on the margin of the ulcer ſubſided, and the ſloughs fell away. This commonly happened in four or five days; but in ſome caſes the inflamed portion turned black and mortified, with a fetid diſcharge, in leſs than forty-eight hours.

Contuſed ſpots, even where the cuticle was not broken, were not exempted from this general tendency to ulcer. But parts that had been ſcalded or burnt, above all other accidents, moſt quickly aſſumed the nature of this horrid ſore; ſpread and inflamed more rapidly, and in the end put on the moſt formidable appearance: deeper and larger ſloughs were the conſequence, and ſymptomatic fever violent in proportion. This was a general remark in every ſhip.

Even in the early ſtage, and ſometimes before the cuticle had burſt, ſo as to expoſe the naked ſurface, buboes appeared in the groin and axilla, not to be touched without much pain, and always attended with fever. Theſe, however, ſeldom ſuppurated; but when they did, they conſtantly exhibited the complexion of the parent ſore. In the Terrible, the glands of the groin were more liable to be affected than was obſerved in the other ſhips: and in the Triumph only I have heard of them ſuppurating.

Although for the moſt part theſe ulcers ſprung from ſome external injury, yet we have met with a number of caſes, where neither wound, puncture, ſcab, or contuſion, could be ſaid to have firſt taken place. A ſmall circumſcribed red ſpot would be firſt perceived, ſcarcely to be felt; but in a few hours riſing to a pimple, becoming black in the centre, and inflamed round the edges, till it increaſed in ſize, ſwelled and aſſumed every characteriſtic ſymptom, with concomitant fever and ſubſequent ulceration, ſloughs and fetid diſcharge.

In the Meduſa's hoſpital, at the ſeveral times the ſick of the fleet were carried to port, were ſome caſes of the common ulcer, ſent from ſhips that had never been infeſted with the preſent diſeaſe. No particular attention was paid to keep theſe men at a diſtance from the others: ſome lay in the cradles next to the worſt of the Queen Charlotte's people; yet we obſerved no diſpoſition in them to put on the malignant form, but continued, while under our treatment, to do well.

To correct the bad ſmell of the matter we had recourſe to none of the uſual agents. The lamps for diffuſing the acetous vapor were conſtantly kept trimmed; but our attention was chiefly directed to the ſpeedy removal of the dreſſings, and by that means we ſeldom found the effluvium ſo offenſive as not to be approached with eaſe. While the men with ulcers remained in the Meduſa, the duty of the ſurgeons and mates kept them conſtantly by the bedſide of the patient.

The future cruizes of this campaign by no means exhibited ſo many bad caſes as the firſt; more or leſs of the general diſpoſition to ulcer remained in the Queen Charlotte, Royal Sovereign, Terrible, and Saturn, but were more ſucceſsfully treated. The other ſhips of the fleet continued perfectly free from this ſore.

During the campaign of 1798, we have had freſh horrors to encounter. The Terrible had never been completely free, but the Royal Sovereign, Glory, and Triumph, have been great ſufferers indeed. The deſcription and progreſs differ little from the preceding account; but from the multitude of ſevere caſes that have occurred, the ſurgeons of theſe ſhips have had more laborious duty to perform, than has ever been known in the Channel ſince our attendance. Of all diſeaſes that are liable to accumulate in a ſhip, one of the moſt improper muſt be ſuch an ulcer as we are deſcribing. Dangerous in its diſpoſition and iſſue, generating a matter fetid beyond compare, the very atmoſphere near the patient poſſeſſes a degree of peſtilence that cannot be ſufficiently corrected in a common ſick berth. But if, as is generally aſſerted, this ulcer is of a contagious nature, the firſt thing to be done for the relief of the unfortunate ſufferer ought to be immediate removal from the ſhip; and this alſo is the only certain ſecurity for the healthy part of the crew. But in ſituations of this kind at ſea, how is the ſtrength of a patient to be ſuſtained without food ſuited to the weak condition of his ſtomach, and the nature of his affliction? The ſecond ſtage of this ulcer is marked by emaciation and the utmoſt debility, and a diſcharge of matter from an ulcerated ſurface, ſometimes moſt profuſe and exhauſting. If the former ſervice of the fleet ſo ſtrongly proved the utility of an hoſpital-ſhip, the want of one was now equally remarked. The timely removal in the preceding ſummer ſoon leſſened the number of patients in theſe ulcers, while at the ſame time the diet was ſuch as to afford them every delicacy and comfort; beſides all the advantages to be derived from lodging, cleanlineſs, and nurſing.

The following extract of a letter from Dr. Browne, of the Royal Sovereign, dated at ſea, the 18th of Auguſt 1798, will give ſome idea of the ſituation of his ſick berth, from this peſtilential ſore;

"Since I had laſt the pleaſure of ſeeing you, "we have been miſerably haraſſed by thoſe ulcers "of the very worſt kind; and the rapidity with "which the ſlighteſt injury to the ſkin degenerated "into ulcer, and the havoc it made on the ſurrounding parts, in a few days, often hours, were "far beyond any thing I had ever met with, in "either Eaſt or Weſt India ſtations. I have at "preſent thirty-ſeven in my liſt, in this horrid

" ulcer; and ſome of theſe, of very large ſize
" indeed. When the ſhip was paid we had but
" few in this complaint on board; and theſe were
" in a healing way, and promiſed ſo fair that I did
" not think them objects for an hoſpital. Two
" days after we ſailed from Cawſand Bay, I was
" alarmed to find many of my ſores nearly cicatrized,
" diſplaying on the inner edge of the cicatrix a
" watery bladder, with a dark-brown or black
" ſpot in the middle. This was the focus
" whence the flame ſpread; and, in the ſpace of
" three, four, or five days, deſtroyed not only the
" labour of many weeks, but enlarged wounds to
" three times their original dimenſions; erroding
" integuments, muſcles, tendons, membranes, and
" even the bones themſelves. Wounds on the
" body, head, &c. were equally affected with the
" extremities. In ſhort, I never met with any
" thing like it in the courſe of my practice. The
" patients had violent fever, uſhered in by uncommon
" rigors and tremor; with ſuch intolerable
" pain in the affected part, that opium
" ſeemed to have loſt all its powers of giving
" relief. Some of them had a ſevere ſingultus,
" during the ſphacelation, and others, violent
" vomiting; in either æther and opium afforded
" little mitigation of the ſymptoms: bark and
" wine had no apparent effect. The powder of
" ipecac. adminiſtered in three and four grain doſes,
" once and ſometimes twice a day, gave more
" relief in the febrile ſtate than any medicine
" I tried. This was our ſituation nearly a fort-

" night, and ſeemed quite the rage of a peſti-
" lence.

" I have now got my ſores reduced to a more
" promiſing ſtate; but the devaſtations occaſioned
" in that ſhort period will be the cauſe of ſeveral
" men loſing their limbs. I have only ventured
" on one operation, a ſmall one, a part of the
" hand: it promiſes well, this being the third
" day; for nothing could tempt me to ſuch a
" ſtep during the rage of the contagion. Chang-
" ing the ſick berth did good; and I made ample
" uſe of Dr. Smyth's nitrous gas. How far it
" tended to check the contagion I am not at pre-
" ſent diſpoſed to ſay: I aſſure you I never met
" with any thing equal to it for checking and
" ameliorating, nay totally deſtroying, bad ſmells.
" Our ſores, while ſphacelating and ſloughing off,
" were attended with ſuch an intolerable ſtench,
" that the dreſſers and attendants were often
" obliged to leave off for a few minutes. But on
" the gas being applied around the limb for a
" minute or two, it became perfectly ſweet; ſo
" that you might ſtand over the ſore, without
" having your noſe offended.

" My ſick berth is extremely well ventilated;
" but if ever I diſcover an uncomfortable ſmell,
" which it ſometimes has, from its vicinity to the
" head in particular ſituations of the ſhip reſpecting
" the wind, I then employ gas, and find it anſwer
" my wiſh." (Would not a little tobacco in the
noſe do as well? T. T.)

"I ought to have mentioned that drunkenneſs "was not ſo prevalent in our ſhip at laſt payment, "as uſual; and that the contagion (allow the "phraſe, for I cannot impute it entirely to bad "habit of body) broke out in three very ſober "men, who had been in my liſt for ſeveral weeks, "conſequently were always under my eye: indeed "I did not find that the profeſſed drunkards "fared worſe than their more ſober ſhipmates.

"I am happy to ſay I find Mr. Baynton's "plan equally as ſucceſsful as ever in *old ulcers*: "in recent ones it does not anſwer my intentions; "but the fault may be mine, and not that of this "improved treatment." Mr. Baynton only recommends it in old ulcers.

This affecting narrative of Dr. Browne concludes with his regret that there was no hoſpital-ſhip where theſe pitiable objects might be moved in the early ſtage of the ulcer, whether for ſecurity againſt infection, or to give the men a better chance of recovery by advantages which they could not have in a common ſick berth.

In the Glory it did not appear, from Mr. Carter's obſervations, that his caſes ever acquired the formidable aſpect of thoſe in the Royal Sovereign; but the ſame general diſpoſition of the ulcer was apparent. He particularly remarked that ſcalds and burns, above all others, ſoon aſſumed the malignant complexion, painful inflammation with ardent fever, and followed by fetid matter, and very large ſloughs of the ſkin and muſcular parts.

It appears from the following communication by Mr. Thomas Moffat, of the Triumph, that the ſhip's company have alſo ſuffered in a ſevere degree from this peſtilential ſore. The Triumph joined the fleet of Lord Viſcount Duncan a ſhort time before the victory over the Batavian fleet, but returned to Portſmouth, and accompanied the Channel ſquadron laſt ſummer.

"SIR, Triumph at Sea, 9th July 1798.

"Agreeable to your requeſt, made in the circular letter of April laſt, and urged by daily proofs of its havock, I have directed my attention, in a particular manner, to the inveſtigation of the nature and cauſes of that ſpecies of ulcer which has lately been ſo deſtructive in ſhips: and on ſuch an important ſubject it pains me much that I have ſo little ſatisfactory to offer.

"My firſt knowledge of its exiſtence was from a man ſuperficially wounded on the leg in the late action in the North Sea, being ſent to Haſlar Hoſpital in October laſt, where it run through the courſe hereafter deſcribed, and ſpread ſo much as to render amputation neceſſary: the ſtump ſoon after was attacked in the ſame way, and in a ſhort time cauſed his death. About the ſame time it made its appearance on board, but without being much attended to till March laſt, when every ſcratch, even the puncture of a lancet in bleeding, became a formidable ulcer, occaſioning, in a great variety of inſtances, buboes in the groin and arm-pit, which generally ſuppurated; the ſkin, after the application of a bliſter, healed with much difficulty, and rarely without ſpreading and inflaming conſiderably. Scalds, more than any other ſpecies of injury, were obſerved to terminate in this manner.

"For ſome days after the wound or other injury was inflicted, every thing went on well; when ſuddenly a violent fever came on, generally towards evening, and continued without any intermiſſion for two or three days, ſometimes a week; the ſore meanwhile becoming inflamed and livid for a conſiderable diſtance around, throwing off very deep and fetid ſloughs, of a grumous appearance, till the ſore was twice or thrice its former ſize, with a ragged ſurface, as if gnawed by a dog, and high reflected edges. As it ceaſes to caſt off ſloughs, the fever ſubſides, and frequently both are over in two nights. After a length of time, more or leſs in different caſes, when the ſore had been brought to a healing ſtate, it has frequently run the ſame courſe over again for ſeveral times ſucceſſively.

"I have no doubt of its being contagious: laſt ſummer it exiſted in the Channel fleet; while in the North Sea it was unknown; and as ſoon as we came round to Spithead it made its appearance on board. Several caſes of ulcer and ſcalded feet, that have been kept entirely ſeparate from the ſhip's company, have healed kindly, while others in exactly ſimilar ſituations have required three or four months to heal. I have lately confined to the ſick berth every bad caſe, and dreſſed them there; ſince which fewer ſores have been infected, and theſe appear to have loſt a great deal of their original malignity.

" From the appearances above mentioned, recourſe was naturally had at firſt to bark, wine, and opium, which in almoſt every inſtance did harm, by increaſing the fever and inflammation; in none any good. Poultices never failed, if applied but for forty-eight hours, to occaſion hæmorrhage. Blood-letting on the firſt acceſſion of fever, with a ſtrict antiphlogiſtic regimen and conſtant confinement to bed, were then adopted, and with much more ſucceſs than the former.

" As ſoon as I met with Mr. David Paterſon's letter to the Commiſſioners of Sick and Wounded, reſpecting a ſucceſsful treatment of a ſimilar kind of ulcer by nitrous fumigation at Forton Hoſpital, I had immediate recourſe to the ſame plan, which I entered upon with the moſt ſanguine hopes of like ſucceſs. At that time there were twenty-five ulcers on the liſt, in all the different ſtages, a few of which I dreſſed with ſimple ointment, that I might judge more correctly of the effects of the fumigation on the others. The firſt five or ſix days it ſeemed to be of ſervice, by correcting the putrid diſcharge of thoſe in a ſloughing ſtate, and thoſe that were previouſly clean began to cicatrize: in all it ſenſibly diminiſhed the quantity diſcharged, and rendered it thicker. I was for theſe reaſons induced to ſpeak favorably of its effects in my weekly return to the Sick and Hurt Board; which, after a farther trial, I was obliged to retract almoſt *in toto*, much to my ſorrow and diſappointment. In that of the 1ſt inſtant I wrote as follows: "In "my return of the 24th ult. I ſtated ſome good "effects to have followed the nitrous fumiga- "tion in caſes of bad ulcer, and from a farther "continuation I had ſanguine hopes of eradicating "that malignity which has ſo peculiarly of late "attended every ulcer. But in the courſe of laſt "week ſeveral have relapſed, and run the ſame "courſe over again of inflammation, ſloughing, "&c. as at firſt, whilſt in others it has produced "ſuch exceſſive, uninterrupted pain, as to oblige "me to deſiſt from its farther uſe. Moſt of the "others remain ſtationary. In ſuch as can bear "it, I ſhall continue to give a fair, impartial trial "to the fumigating plan."

"Thoſe caſes where it produced ſuch exceſſive pain felt ſpeedy relief on omitting it. I began its uſe on a ſcalded foot before any bad ſymptoms appeared, hoping thereby to obviate the operation of the infection; but it notwithſtanding ran exactly the ſame courſe as others. Thoſe caſes I mentioned before to have dreſſed with ſimple ointment are juſt as far advanced as if they had been fumigated; indeed more ſo than thoſe where it occaſioned ſo much pain.

"I have now continued it three weeks in the moſt ſedulous manner twice every day; and the only good effect I can with any confidence vouch for the truth of is its ſweetening the air in the ſick berth, which had begun to ſmell offenſive, from ſo many large putrid ulcers being confined there. No other ill effects were obſerved to follow its uſe, but occaſional coughing, and that only at firſt, or when the head was held immediately over the pipkin: and one man vomited whenever it came near him, unleſs near an open port to inhale freſh air.

"I have again returned to the antiphlogiſtic plan with increaſing confidence, being convinced more and more daily of the whole miſchief lying in exceſſive excitement from the ſtimulus of contagion, which can only be brought down by blood-letting and other evacuations, by cold applications to the part itſelf, ſtrict confinement to a recumbent poſture, cooling regimen, and the mildeſt dreſſings.

"By ſeparating every man who appears infected from the others, I entertain hopes of extirpating it entirely from the ſhip, or at leaſt of circumſcribing its ravages.

"Since we left Spithead, a number of very obſtinate caſes of acute rheumatiſm has occurred, which have required almoſt daily evacuations, either by the lancet, by purging, or by the ſkin.

"In ſcurvy I have recourſe to the lemon-juice with its wonted ſucceſs. In one caſe the ſymptoms reſembled rheumatiſm ſo much, as to render it very difficult to make the diſtinction. A few doſes of the acid ſoon removed all doubt. I am much inclined to think that ſimilar caſes occur more frequently than we are aware of*.

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* *Vide* the former works of the author.

" It may, perhaps, be worthy of remark, that a man (my own ſervant) caught the ſmall-pox when in Torbay laſt, and the eruption had taken place three days before it was diſcovered, owing to his having been confined to bed with rheumatiſm, in the cockpit, for ſome time before, yet no farther infection took place. The admiral ſent him to Plymouth in a cutter the day we left Torbay. I am, Sir, your very humble ſervant,

" THOMAS MOFFAT."

" To Dr. TROTTER."

In a ſubſequent communication of Mr. Moffat I obſerve the following remark on the nitrous gas. " I forgot to obſerve," he ſays, " in my letter, " that the uſe of nitrous gas, as a deſtroyer of " contagion and peſtilential air, is not a very new " diſcovery. Dr. Johnſton of Worceſter, eight " or nine years ago, recommended it very ſtrongly " to Captain Effington, and ſhewed him the pro- " ceſs in his chimney-corner. Captain Effington " is now in the Triumph, and I give it on his " authority."

In the month of October, and when the weather began to grow cold, Mr. Moffat firſt obſerved a change for the better in the condition of his patients. Fewer caſes of malignancy occurred; and wounds and accidents were diſpoſed to heal more readily, without aſſuming the appearance of the epidemic ulcer. He was, however, under the neceſſity of ſending fifteen to the hoſpital-ſhip in

Cork harbour, during a cruize off Ireland in queſt of the French ſquadron which was ſo completely beaten by Sir John Warren's ſhips afterwards.

In Auguſt a caſe, on board the Atlas, in a marine, was mentioned to me by Mr. Brodie, as partaking of the nature of this ulcer, but was ſent away immediately, from its ſuſpicious appearance.

The following caſe, tranſmitted by Mr. John Crawford, ſeems alſo to have been nearly allied to our malignant ulcer. But it is valuable from the ſucceſsful iſſue, and the ingenious mode of treatment.

"His Majeſty's ſhip Succeſs, off
Havre, Nov. 14th, 1798.

"SIR,

"The ſame motive that prompted me before to write you, ſtill actuates me to communicate every uncommon obſervation that comes within my ability. I can only regret my ſituation affords me ſo few opportunities of contributing my mite to ſo laudable a work. The hint of ſending you the ſubjoined caſe of ulcer I took from your own circular letter. I have never read Dr. Rollo's work there alluded to.

"*October* 15th, 1798. Samuel Seedſman, aged twenty-three years, of a lax fibre, yet general good health, had the inner and fore part of his left foot ſcalded by a ſmall quantity of boiling water, which produced two veſications, each about the ſize of a ſhilling. He was taken into the liſt, the bliſters cut, and dreſſed with a pledget of cerate: this was repeated until the morning of the fifth day after the accident, when I obſerved they had a dark purpliſh appearance, and that on the lint there was little or no diſcharge. He now complained they were very painful, and that he had no ſleep for the two laſt nights. This day inſerted the caſe in my journal: dreſſed with cerate, and applied over catap. com. calid.

Hauſt. anod. ſum. hora ſom.

" 20th. Found little alteration; the ſame dark eryſipelatous appearance continues: the lint a little diſcoloured with a browniſh diſcharge: ſaid he did not ſleep well, but had not ſo much pain as on the preceding night.

Catap. emoll. et hauſt. anod.

" 21ſt. The ſurface of the ſores, which before was ſmooth, is now ſomewhat ſunk and unequal: a ſmall quantity of browniſh fluid on the lint. They are ſtill painful.

℞ P. cort. Per. ℥i. vin. aduſt. ℥i. miſce
et adde aq. commun. lbiſs ſumend.
toto in die: catap. ut ante.

" 22d. They have nearly the ſame appearance; are more enlarged.

Mixt. cort. Per. et catap. vice hauſt. anod. u. a.

" 23d. The ſores are conſiderably deeper, and a greater diſcharge of the brown-coloured fluid; the edges are hard and red, and are in appearance like a ſmall earth-worm round the ſore: the integuments for an inch round are much inflamed.

Mixt. cort. Per. &c. ut heri.

" 24th. They have on their ſurface ſmall pupillæ, which bled on removing the dreſſings: they have ſtill the ſame dark eryſipelatous caſt, the edges ragged, the diſcharge brown and excoriating:—omitted the poultice, and ſprinkled one ſore over with the

Cort. Per. mixt. cort. Peruv. ut ante.

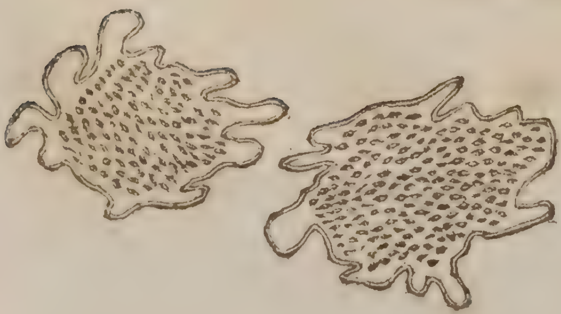
" 25th. The edges ſtill more jagged and uneven, the ſurface of the ſore covered with ſmall millet-like granulations, which bleed on the ſlighteſt touch; ſtill a thin brown-ſtreaked diſcharge.

Mixt. cort. Per. Sprinkled the bark over both the ſores.

I did not yeſterday over both, that I might ſee the colour of the diſcharge.

" 26th. The ſurface of the ſores unequal and excavated, the edges ragged and notched in a manner I never ſaw before, and which I cannot deſcribe better than by ſketching the figures with my pen: they have a moſt diſagreeable ſmell.

Mixt. cort. Per.
Sprinkled them over with
Hydrag. nit. rub.



This is as near the reſemblance of them at this period as I can give the idea.

" 27th. The dark eryſipelatous colour ſtill remains; the ſurface is more irregular; the narrow ſores on the edges nearly communicate with each other: there was a greater diſcharge incited by the precipate, but it was nearly of the ſame colour: again ſprinkled them with the bark.

℞ Mixt. cort. Per. additione ſucc. limon. ℥ vi.

" 28th. A greater diſcharge on the lint; the ſmall ſores on the edges enlarging, and ſeem becoming independent of the large ones, which have greatly increaſed ſince yeſterday.

Mixt. cort. Per. &c.
App. cort. Per. ad ulcera ut olim.

" 29th. Several of the ſmall ſores round the edges are independent of their parent; the interſtice between them filled with a hard browniſh ſubſtance: they are not larger ſince yeſterday.

Mixt. cort. Per. &c. ut heri.

" 30th. On waſhing off the bark, diſcovered that they had not their uſual eryſipelatous appearance, that their ſurface was more ſmooth, and they had not their uſual bad ſmell. I fancy the ſprinkling them with bark has not only corrected this, but prevented their enlarging by abſorbing the excoriating diſcharge.

Mixt. cort. Per. u. a. omitted ſprinkling one ſore with bark to ſee the diſcharge.

" 31ſt. The diſcharge thin and whitiſh, or rather aſh-coloured; their diſpoſition towards enlarging ſeems to be ſtopped; there is no appearance of granulations; their edges feel horny to the touch. They are now at leaſt three times as large as they were on the 25th.

Mixt. cort. Per. & app. hydrarg. nitrat. Sprinkled the bark as before.

" November 1ſt. Still no appearance of granulations: they are not near ſo painful.

Mixt. cort. Per. &c.

" 2d. They are evidently diſpoſed to heal, and are ſomewhat filled up ſince yeſterday. There is a degree of redneſs round their edges, which I judge cauſed by the cauſtic. Omitted the ſprinkling them with bark.

Mixt. cort. Per. u. a.

" 3d. The diſcharge a glairy pale-coloured pus, mixed with ſmall browniſh particles; the ſores are healing faſt, but not with healthy granulations: the edges not ſo red.

Mixt. cort. Per. u. a.

" 4th. The diſcharge is thicker, and they are incarning faſt without granulations.

" 5th. Several of the ſmall ſores equal with the ſurface; the large ones are nearly ſo, and continue contracting.

Mixt. cort. Per. &c.

" 6th. The ſmall ſores healed, and the large ones cloſing rapidly.

" 7th. They continue contracting: omitted the bark mixture.

" 10th. He returned to duty.

" I have only to obſerve, that although at firſt they had ſome appearance of being ſcorbutic, yet no cauſe of ſuſpicion for their being ſo exiſted. We had been, previous to their appearance, near three months at Spithead, during which time the ſhip's company had plenty of fruit, vegetables, fine weather, and no hard work; nor was there any tendency to that diſeaſe on our arrival from ſea.

" When I firſt began the remarks, I had no idea of ſending them to you, or I would have been at more pains in arranging them. They are, as you ſee them, ſimply copied from my journal. I am, with the greateſt reſpect, Sir, your moſt obedient humble ſervant,

" JOHN CRAWFORD."

" To Dr. TROTTER."

Such

Such is the brief hiſtory of this virulent ſore, as it has afflicted the ſeamen in the ſhips in the Channel. It has alſo been common among others in Lord Duncan's fleet, particularly the Ganges; but we have obtained no information from that quarter.

The ſtriking peculiarities of this ulcer are,

1ſt. Its rapid progreſs, by which, in the ſpace of a few days, it paſſes through the various ſtages of inflammation, gangrene, and ſphacelus, when the injured parts ſlough away, which puts an end to an acute concomitant fever.

2dly. It has been obſerved to prevail more in ſhips in port than at ſea, or very ſhortly after leaving the harbour.

3dly. It has never aſſumed the complexion of a ſcorbutic ulcer, which is diſtinguiſhed by the dark-coloured fungous maſs laying over its ſurface, that on being removed, is quickly regenerated, and is commonly attended with ſome ſymptoms of ſcurvy, ſuch as ſoft ſwellings of the legs, ſpungy gums, and ſallow looks; on the contrary, in this ulcer, when the putrid parts ſeparate, the ſurface is of a light florid colour. The ſcorbutic ſore is ſeldom painful; our ulcer is attended at times with exquiſite torment.

4thly. It has not been relieved by large quantities of lemon-juice, even to a bottle *per diem*; nay, we have thought that in ſome caſes, much harm was done by this practice in the firſt ſtage.

5thly. We have not been able to diſtinguiſh particular conſtitutions more liable to be affected with it than others, except the ſtrong and robuſt; nor have ſeamen been more exempt from it than landmen.

6thly. It has occurred in ſhips where every attention is paid to exact diſcipline, cleanlineſs, ventilation, and every circumſtance connected with preſerving health. It has alſo been treated by ſome of the moſt experienced and able ſurgeons in the navy: and there is nothing peculiar to the ſoil ſurrounding the ports of the Channel where it has appeared.

We cannot aſſert that it is a new diſeaſe; but we meet with nothing, in authors on Surgery, that is ſatisfactory in either the hiſtory of the ſymptoms or method of cure. Bell and Home, in their reſpective works, preſent us with nothing that anſwers our deſcription; yet the experience of the latter in different climates, and in army hoſpitals, afforded very favourable opportunities. The ſurgeons of naval hoſpitals may have paid leſs attention to it, from the ſtage of fever and inflammation being generally on the decline, or finiſhed before the patient comes under their care. About the beginning of the war, I think early in 1794, an unuſual number of men were ſent to the hoſpital at Haſlar, from the Hector, with large ulcers. Some of them that I ſaw very much reſembled the diſeaſe in queſtion, after the ſphacelations fell off, and left the ſurface clean. Theſe men, from their immenſe number, belonging to one ſhip, were, not without much reaſon, ſuſpected of having tampered with their ſores, by eſcharotic applications, &c.

and

and this was confirmed by one of them confeſſing to the nurſe, a little before his death, that he had bound a halfpenny over the part, in order to enlarge the dimenſions, and give the ulcer a foul appearance. No other man, however, could be brought to this confeſſion; and it is probable that their affliction aroſe from very different cauſes. In the preſent inſtance we have no ſuſpicion of the kind; and we can ſafely reſcue our patients from ſo foul an imputation. Men of the moſt approved conduct in their ſhips, whoſe characters were completely known, and whoſe veracity could not be impeached, and who could have no view in that mode of torture, have been ſufferers in this complaint.

The writers on Weſt-India diſeaſes mention obſtinate kinds of ulcer, which they have met with in theſe iſlands, and which were ſeldom treated with ſucceſs, unleſs on going to colder climates. But their deſcription does not anſwer to the early hiſtory of our ſore, ſuch as the degree of fever, exceſſive inflammation, and conſequent ſphacelus. Ulcers very difficult of cure appeared at Corſica, while poſſeſſed by the Britiſh forces: we have alſo heard that uncommon numbers in this complaint have been ſent to the naval hoſpital at the Cape of Good Hope. Such accounts, however, as have been reported to us do not correſpond with the Channel ulcer. Cleghorn, in his "Diſeaſes of Minorca," ſpeaks of bad ulcers in that iſland; but nothing further is detailed for our information.

Dr. Rollo, ſurgeon-general to the Royal Artillery, in the firſt edition of his juſtly-valued work on "Diabetes," has added, "A ſhort Account of a Morbid Poiſon acting on Sores, and of the Method of deſtroying it." P. 253. (London, Dilly. 1797.) This account is ſo intereſting in the preſent diſcuſſion, and ſo nearly reſembles the deſcription which we have given, that we ſhall tranſcribe the whole that applies to our purpoſe.

"After the formation of the Brigade of Royal "Horſe Artillery, many accidents occurred, eſpe"cially in kicks in the legs of the men by the "horſes feet; and being generally on the ſhin, very "unpleaſant ſores were produced. The wound "was ſometimes ſmall and punctured, having "ariſen from the turned-up part of the horſe's "ſhoe, as formerly practiſed. The bone was often "laid bare. We ſeldom had leſs than forty caſes "of ſores at that time in the hoſpital.

"When this ſore engaged our particular atten"tion, and, from the rapidity of its progreſs and "effects, very watchful examination was beſtowed, "it was found that a ſore of any extent (ſome "were very conſiderable, as 3 or 4 by 5 or 6 "inches, and others ſmall), in the promiſing ſtate "of healthy cicatrization, was liable to have a "ſolitary ulceration on its edge, of unequal dimen"ſions, the ſize varying, being ſmaller or larger "than a pea. This diſtinct little ulcer was of a "darkiſh colour, its edges jagged, its bottom un"equal and ragged, and diſcharged a thin matter, "having a peculiar ſmell. Such was the earlieſt

" ſtate in which it was perceived; but probably it " might have been diſtinguiſhable ſooner. The " diſappearance of the ſore in the hoſpital deprived " us of a more minute and early inquiry.

" The day after the little ulcer had been diſco- " vered, it had acquired the ſize of a ſixpence or " a ſhilling, extending itſelf every way, even on the " ſhin as well as on the ſurface of the former ſore: " the diſcharge was now changed, having become " thickiſh, of a whitiſh colour, intermixed with " dark ſhades, and adhering ſtrongly to the ſurface " of the part; the peculiarity of the ſmell conti- " nued, and was become more offenſive.

" In another day the ulcer had ſpread farther; " and on other parts of the former ſore might pro- " bably be perceived ſmall ulcerations of the " ſame appearance and kind as thoſe of the firſt " diſcovery, and which went on extending until " they united.

" Five or ſix days from the appearance of the " ſmall ulcer or ulceration, when it had extended " (or by its union with other ulceration) over one " third of the former ſore, with pain and redneſs in " the courſe of the lymphatics, and the glands " through which they led, with enlargement of " them, general indiſpoſition of body became evi- " dent. This conſiſted in nauſea, loſs of appetite, " heat of ſkin, a very ſmall and quick pulſe, " extreme irritability, a whitiſh tongue, and thirſt. " When theſe ſymptoms took place, the ulceration " rapidly went on, extending beyond the limits of

" the former ſore, and deſtroying the adjacent " parts. In this ſtate of the ſore, the parts were " puffed and bloody, accompanied with much " uneaſineſs, having a burning and lancinating " ſenſation; and the action frequently terminated " in apparent gangrene. Sometimes, however, " the ulcerating part remained covered with the " thick adheſive matter, and gradually without " any other apparent change, aſſumed the healing " ſtate.

" The operation of the poiſon in ſlowneſs or " rapidity probably depended on ſome conſtitutional " circumſtance, as it was not in all of equal degrees " of facility. Theſe ſores, which ſpread rapidly " and extenſively to ſloughing, and even to gangrene, from one, two, or more ſmall ulcerations, " very likely happened in thoſe who might be ſaid " to have a conſtitutional ſuſceptibility; while, on " the contrary, in thoſe where the ulcerations continued diſtinct, and remained covered with a " thick, whitiſh, and adheſive matter, without " acquiring the ſloughing and gangrenous ſtates, " their conſtitutions had no favorable tendency to " the operation of the poiſon.

" The firſt favorable change was in the appearance on the edges of the ſore, with a ſeparation " of dead parts, which went on until the whole " were thrown off; and then healthy granulation " and cicatrization took place.

" The moſt ſingular phænomena in the progreſs " of this ſore conſiſted in the various actions which " were not unfrequently perceived in it at the ſame

" time, and which ſeemed to depend on conſtitu-
" tional differences. We have ſeen the ulcerating,
" ſuppurating, and cicatrizing ſtates going on at
" the ſame time in one ſore. It was not unuſual
" for the ulcerating proceſs to be checked before it
" had extended over the whole ſore, when the
" former cicatrizing parts went on without inter-
" ruption; and the ulcerating part, having aſſumed
" the diſpoſition to healthy action, arrived at the
" cicatrizing point, and then proceeded with the
" others to ſkinning.

" The ſmallneſs of the ulcer, the appearance of
" its edge and baſe, its ulcerative tendency, the
" abſorption of its matter affecting the lymphatic
" glands and veſſels, and then the whole ſyſtem,
" pointed out the operation of *a morbid poiſon*.

" The action of this poiſon ſeemed to be limited,
" and confined to ſpecific effects; the firſt were
" local, producing only general affection by a more
" extenſive operation on the ſore, and which in a
" certain time terminated in the healthful ſeparation
" of parts, granulation and cicatrization, and a ſtate
" of conſtitutional convaleſcence.

" Sores having ſpecific actions, as the venereal,
" ſcrophulous, and variolous, reſiſted this poiſon,
" and in the hoſpital were not affected, though ſuch
" patients were in the ſame wards.

" Some men in quarters, one with a bliſtered
" part, another with a cut on the outer ear, and
" another with a ſore on the leg, beſides ſeveral
" others, were affected with this poiſon. The
" men in the ſame wards were not generally

“ affected with it; thoſe with ſpecific ſores, or with
“ ſores of ſmall extent, and having little diſcharge,
“ though laying within two feet of the men under
“ the action of the poiſon, eſcaped.

“ From the very ſerious ravages of this poiſon,
“ we were induced to make the moſt particular
“ inquiries. Being fully perſuaded it was neither
“ the ſore acted upon by eriſipelas, nor the ſore
“ deſcribed as peculiar to hoſpitals, we found our-
“ ſelves involved in conſiderable difficulties. We
“ conſulted every thing that had been written
“ by the ancients or moderns within our reach, and
“ we found nothing reſembling our ſore. We
“ ſaw however ſimilitudes, in ſome of its ſtages, to
“ phagedæna, eſpecially as it is deſcribed by
“ Mr. Adams, in his account of morbid poiſons.
“ But the local attack on the ſore, its progreſs, and
“ the conſequent general indiſpoſition, and changes
“ on the ſore, remained new, and to us unnoticed
“ and unexplained.

“ Impreſſed ſtrongly with the notion that a
“ morbid poiſon was applied locally to a part of
“ the ſore, which, like the venereal poiſon, had
“ the power of aſſimilation, and thus augmenting
“ its power; as alſo of being abſorbed, producing
“ general effects on the ſyſtem, and a re-action on
“ the ſore; we were determined to adopt local
“ means of treatment, conſiſting in the chemical
“ deſtruction of the poiſon, and in parts under
“ its direct action, and in exciting a new action.

“ We were led to propoſe an early and vigorous
“ treatment of the local operation, from obſerving
“ that

" that when the conſtitutional effect took place, " any plan of cure was inadequate, the diſeaſe then " going on, and apparently ceaſing of itſelf; but " but not until very extenſive deſtruction of parts " had been accompliſhed.

" The oxygenated muriatic acid, and the nitrates " of ſilver and mercury, were the applications " employed; and latterly, the oxygenated muriatic " acid gas.

" When either of theſe were applied four or five " times, the little ulcer ſoon put on the ſuppurating " ſtate, and granulated. They did not give pain " in any degree, and it was of ſhort continuance. " While the ulcer was directly touched with the " nitrated ſilver, the whole ſore was moiſtened " with a dilute ſolution of nitrated mercury, or a " mixture of the oxygenated muriatic acid in diſtilled " water; after which the whole was covered with " lint that had been previouſly moiſtened by æther, " or the oxygenated muriatic gas applied to the " ulcer, and over the ſore the dilute ſolution of " nitrated mercury in diſtilled water.

" By theſe means, diligently perſevered in, the " poiſon and ulcer were deſtroyed, and the ſore " went on cicatrizing. The only failures were in " thoſe caſes where the ulceration had ſo extended " that the nitrated ſilver, oxygenated muriatic acid " or gas, could not be completely employed. It " is neceſſary to mention that waſhing the ſore " with warm water was always previouſly per- " formed.

"The ſucceſs of this treatment afforded additional ſtrength to the opinion we had formed of the exiſtence of a poiſon, its locality, and that it poſſeſſed, like other poiſons, the property of aſſimilation, or producing matter ſimilar to itſelf.

"Having gained this much, we were prepared to make ſome inquiry into its origin.

"From the local commencement of the poiſon, and the power we had of deſtroying its peculiar nature, and conſequent action, by a direct application, and at the ſame time conſidering the circumſtances of the ſore previous to its appearance, we entertained the notion that the poiſon was formed on the ſurface or edges of the ſore.

"In all theſe ſores on which the poiſon ſhowed itſelf, both in and out of the hoſpital, the diſcharge from them was conſiderable: they were moſt generally dreſſed with an ointment of wax and oil ſpread over coarſe linen, and when dreſſed the matter was ſeldom cleaned off; by which it formed incruſtations about the edge, or at a little diſtance from the ſore. This aroſe from the opinion of ſome, that the waſhing of ſores, if it did no harm, was at leaſt ſuperfluous, and from the great number of ſores at that time to be daily dreſſed, by which leſs attention was probably given than might have been otherwiſe required and beſtowed.

"We ſuſpected, however, in a few caſes, that the poiſon was propagated from one ſore to ano-

" ther by means of the ſponge employed in the " occaſional wiping or waſhing, the ſame ſponge " having been unguardedly uſed for different " ſores.

" The diſcharge of a ſore remaining confined, " or ſome of it ſuffered to adhere long on the edge " of the ſore, may undergo ſuch changes as to " produce a matter poſſeſſing new properties of " an apparently poiſonous nature and effect. On " ſeveral ſores, but one in particular, where a conſiderable quantity of finely-powdered nitrated " mercury had been ſprinkled, in twelve hours, " the time of the next dreſſing, the mercury formed " a ſhining cruſt, was firm, and appeared as if a " portion of the mercury had been revived. This " might be owing to hepatic gas on the ſurface of " the ſore.

" Dr. Crawford, in the eightieth volume of the " Philoſophical Tranſactions, p. 391, has made " ſuch experiments on the matter of cancer, that " there can be little doubt of chemical changes " and combinations produced on ſores. This is a " ſubject, however, that has not been carried farther ſince then, as it ought to have been. We " truſt it will gradually appear a ſubject of great " importance, eſpecially as the diſcovery of the " changes the diſcharge of a ſore undergoes will " probably point out, at the ſame time, the remedy " for the ſore."

To this account we ſhall add the remarks made by Mr. Cruikſhank, chemiſt of the Royal Artillery, in conſequence of experiments inſtituted for the purpoſe of examining the matter of this ſore, from the ſame work.

“ The matter of this ſore is ſparingly ſoluble in
“ water, but readily diffuſed through it, producing
“ a milky appearance: pure volatile alkali firſt
“ reduces it to a tranſparent jelly, and after ſome
“ time, diſſolves the greateſt part; a ſimilar effect
“ is produced on pure pus. Theſe ſolutions are
“ but partially precipitated by acids, particularly
“ the ſuphuric. The tincture of litmus and Braſil-
“ wood are not changed by this matter, it does
“ not, therefore, poſſeſs either acid or alkaline
“ properties. If to the filtered ſolution of this
“ matter in diſtilled water, a little nitrated ſilver
“ be added, a whitiſh-coloured precipitate will be
“ produced. Similar precipitates, but much more
“ copious, are occaſioned by nitrated and muriated
“ mercury. When pure pus is treated in the
“ ſame manner, theſe precipitates, particularly
“ that by muriated mercury, have ſomewhat of a
“ different appearance, which it would be difficult
“ to deſcribe. The fetid ſmell is ſomewhat
“ changed by lime-water, but not deſtroyed; the
“ ſulphuric acid rather increaſes it; a ſimilar effect
“ is produced by alcohol, and by the alkaline ſo-
“ lution of arſenic. A decoction of the Peruvian
“ bark does not deſtroy the fetor. This, how-
“ ever, is effected by the nitrates and muriates of
“ mercury, by the nitrous acid, but moſt com-
“ pletely by the oxygenated muriatic acid and
“ gas. Nitrated ſilver produces very little change,
“ either on its colour or ſmell, a circumſtance the

" more remarkable, as this ſalt poſſeſſes the pro-
" perty of deſtroying the moſt offenſive ſmells,
" even that of the matter of cancer.

" It muſt be allowed that the offenſive ſmell of
" the matter of this ſore is produced by that part
" of the diſcharge which is altered from the na-
" ture of pure pus; for we know that every ill-
" conditioned diſcharge, has more or leſs ſmell,
" while good pus has none. It is a known fact
" in chemiſtry, admitting of few exceptions, that
" a ſubſtance cannot have its ſmell totally de-
" ſtroyed or altered without having its properties
" changed at the ſame time. If, therefore, this
" peculiar matter, by the addition of nitrated or
" muriated mercury, the oxygenated muriatic
" acid, &c. ſhould have its ſmell completely de-
" ſtroyed, there is every reaſon to believe that
" its peculiar properties will be ſo alſo; and
" ſhould it be capable in its original ſtate of pro-
" ducing an ill-conditioned action in ſores, the
" addition of ſuch ſubſtances might prevent this
" miſchief. If it ſhould be ſuppoſed, therefore,
" that an acrid matter ſomehow produced on the
" ſurface of ſores, were capable of producing
" ulceration of a ſpecific kind, and that this ul-
" ceration, like the venereal, ſhould generate more
" of a nature ſimilar to itſelf, capable of extending
" the miſchief, and even of bringing on a general
" affection of the ſyſtem, ſome important conclu-
" ſions might be drawn from theſe experiments.

" 1ſt. It is eaſy to ſee, that a ſore once clean,
" might be preſerved from the effects of the

" matter alluded to, by waſhing it at every dreſſing " with a weak ſolution of nitrated mercury, or the " oxygenated muriatic acid; and that even the " generation of ſuch matter might be entirely pre- " vented by the ſame means.

" 2d. After the action has taken place, and be- " fore a general diſpoſition is formed, it might " be poſſible to put a ſtop to its progreſs by very " active topical applications, ſuch as ſhould be ca- " pable not only of deſtroying the ſpecific nature " of the matter generated, but alſo the action it- " ſelf. From the experiments already related, it " is evident we ſhould prefer in this caſe the moſt " active mercurial preparations, ſuch as red pre- " cipitate not entirely deprived of its acid, or the " muriated mercury; and if an active cauſtic were " to be employed, we ſhould have recourſe to the " ſtrong nitrous acid, applied in Mr. Humpage's " method, rather than the nitrated ſilver, eſpecially " as it may have alſo the effect of changing the na- " ture of the diſcharge. This conſiſts in dipping " a little lint in the acid, and applying it to the " part: it communicates leſs pain than any other " cauſtic, except the nitrate of ſilver."

Thus far the ingenious reflections of this ſcientific chemiſt. Dr. Rollo then adds, " On the " whole, though we have ſuppoſed the formation " of a new morbid poiſon, on the ſurface of cer- " tain ſores, under peculiar circumſtances or ma- " nagement, yet we are rather inclined to change " the appellation *new*, to a poiſon which has been " probably *overlooked*. We have ſeen the com-

" mencing ulceration remain ſome days ſtationary;
" we have ſeen it extending, while the other parts
" of the former ſore were cicatrizing, and the con-
" ſtitutional effects not taking place until the ul-
" ceration had occupied a large part of the ſore;
" and we have ſeen that the painful ſtate and ex-
" treme ſenſibility did not occur until the ſyſtem
" was affected. Therefore, it may be preſumed,
" the early ulceration has been unattended to, and
" the ſtate of the ſore remarked only by authors,
" after it had aſſumed the appearance of phage-
" dœna. For when the ulceration had ſo ſpread
" as to produce the conſtitutional affection, and
" the conſequent rapid changes on the ſore, the
" character of the virulent ſore deſcribed as pha-
" gedœna was formed."

The hiſtory of Dr. Rollo's ulcer, as it occurred in the hoſpital of the Royal Artillery at Woolwich, we thus perceive, bears a ſtrong reſemblance to ours. It does not, however, appear from the doctor's narrative, that very recent wounds were apt to run into this diſpoſition, and his method of accounting for the generation of the poiſon precludes this ſuſpicion. This at once confirms ſome difference of character in the two ulcers. It alſo would appear that the ſore of the artillery ſoldier never became ſo formidable as we have ſeen it among the ſeamen; we cannot, therefore, aſſign any cauſes ſufficiently clear to explain this circumſtance. The irregularity of the habits of life among ſailors were not marked particularly on this occaſion, and in many caſes which we have thought the worſt, theſe exceſſes could not be indulged. But if exceſſive drinking, as in the caſe of the gonorrhœa in the man belonging to the Saturn, had any effect, it acted more by exciting a violent degree of inflammation, than by exhibiting any other peculiar ſymptom. We could ſuſpect nothing hurtful in the atmoſphere: the ſeaſons have not been remarkable for any unuſual conſtitution: the air of the ſhips infeſted with this ulcer was pure and well ventilated, and with all the diſcipline that conduces to health.

Dr. Rollo has entered into an elaborate inveſtigation of the origin of this morbid poiſon, and a chemical theory, with a correſponding practice, are the reſult of his inquiries. We are not diſpoſed to diſpute the ſucceſs of his treatment, but to look for any external noxious power, influencing a diſeaſed action in ſo many caſes of recent venæſection, and other freſh wounds, which have come under our obſervation, is highly embarraſſing. Some caſes we have alſo met with where no previous injury had been offered to even the cuticle, that could ever be ſuſpected or diſcovered: theſe began on the fleſhy part of the leg and fore arm, and were followed with the ſeparation of nearly the whole integuments and muſcular parts of the limb. The want of ſufficient attention in cleaning the edges of old ſores we can ſcarcely take into our account: few hoſpitals, we believe, are attended with more punctuality than the ſick berths of the Royal Sovereign, Triumph, and the other ſhips, and in the neceſſary duty of dreſſing we know that they are ſurpaſſed by none.

Peculiarities of conſtitution have not been remarked in our patients; and men who had but lately come to ſea were equally ſufferers. We did not find that any of them had lately paſſed ſevere courſes of mercury, which have been ſuppoſed to diſpoſe the body to uncommon and obſtinate kinds of ulceration; and the ſuſpicion of ſcurvy was completely out of the queſtion, for the ſores never put on that complexion, and the complaint firſt attracted our notice while the ſhips were in harbour, and the men feeding on freſh beef, with beer, and abundance of vegetables.

The operation of any ſpecific contagion, either generated or imported, leaves us equally in the dark. If there had been ſuch a cauſe, the mode of its application is beyond ſcrutiny: if it could act without actual contact, it muſt be of too ſubtile a nature to become familiar to our ſenſes, and renders every attempt at explanation nugatory. The analogy of ſome other contagions, ſuch as lues venerea, elephantiaſis, lepra, pſora, &c. cannot apply, for theſe have each their peculiar action, and their ſource is eaſily traced. Ulcers, produced by punctures of diſſecting inſtruments, and proving fatal, may be added to this account.

Whatever doubts and difficulties, however, may appear, we ſtill think ſome other channels of information ought to be explored. The prevention of ſo horrid a malady becomes of moſt ſerious conſequence, from the numbers of men in the prime of life that have fallen victims to it, and which has deprived their country of their valuable ſervices at this momentous juncture. Whether, therefore, a morbid poiſon, or a contagious matter, or any other cauſe, may be conſidered as producing this ulcer, it is clear, from the hiſtory given in our ſhips, that there is a condition of body, at the time, which renders it ſuſceptible of the noxious power, if this condition of body be not of itſelf fully adequate to account for the whole. This ſtate, as we have ſeen it, conſiſts in a high degree of health and ſtrength, the freſh bloom of countenance, plumpneſs, and firmneſs of muſcle, without obeſity, florid blood, with arterial fulneſs. This is what formerly was called Phlogiſtic Diatheſis, as diſpoſing the body to inflammatory diſeaſes. Such a condition of body is naturally produced from the ſeamen's diet while in port, when the duty of the ſhip gives no more exerciſe than is merely conducive to health. A pneumatic phyſician will call this a highly oxygenated ſtate of body; but whether this term will be admitted or not, we hold it to be a condition of the body directly oppoſite to that of ſea-ſcurvy.

That there is a ſpecies of ulceration peculiar to a ſcorbutic diatheſis, is a fact as well aſcertained as any in the hiſtory of diſeaſe. That it is produced at ſea by a concurrence of cauſes, but chiefly by a deficiency of recent vegetable matter, we believe to be equally well eſtabliſhed. This peculiar kind of ulceration in a ſcorbutic diſpoſition does not

always

always require the exciting power of external injury to begin it. We have ſeen, and have been told, that the cicatrix of an old ſore breaks out afreſh, and the callus of bones formerly broken is diſſolved. Like the ulcer of our inquiry alſo, the diſpoſition and character of the ſcorbutic ſore are often engrafted on freſh wounds and old ulcers, from whatever cauſe, till in the end they occupy the whole ulcerated ſurface, and exhibit their own features only. A ſcrophulous diſpoſition excites firſt inflammation, and then ulcers of its own kind. The ſecondary ulcers of the venereal virus are alſo produced by a habit of body beginning the diſeaſed action. But the diſpoſition to cancer, the moſt formidable of all ulcers, is firſt latent in the habit, and only in its latter ſtage appears with the character of an open ſore. With all theſe analogies therefore before us, why ſhould we deny that a diſpoſition of body may not alſo be the main cauſe of our ſpecies of ulcer; and that the freſh wound, as in phlebotomy, the bliſter, the ſcald, and burn, with the common ſore, were only ſo many diſeaſed ſpots, where its action could be more eaſily put in motion, than on the ſound parts of the conſtitution, that retained the preſervative powers of health to ſecure them againſt it. The vital fluid oxygenated to a high degree, it appears, imparts ſingular vigor to the circulating ſyſtem: the effect of breathing oxygene on a celebrated chemical philoſopher *, is well

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* Dr. Beddoes.

known: his face in ſhaving was eaſily cut, bled profuſely, and healed with difficulty. This ſtate approaches to the inflammatory, which, in the part wounded, the bleeding probably prevented. Dr. Rollo has told us, that the morbid poiſon was firſt perceived in the edges of healing ſores, as a *diſtinct little ulcer, of a darkiſh colour, its edges jagged, its bottom unequal and rugged, and diſcharged a thin matter, having a peculiar ſmell.* Dr. Browne, in the Royal Sovereign, remarked ſores nearly cicatrized, *diſplaying on the inner edge of the cicatrix a watery bladder, with a dark brown or black ſpot in the middle.* He emphatically adds, this was the *focus* whence the flame ſpread. Thus theſe accurate obſervers give ſimilar evidence, in firſt detecting the beginning embryo: but this *black* or *browniſh ſpot*, it is plain, muſt have undergone previous inflammation, to make it appear in that colour; and the fetid ſmell perceived ſhowed that the ſeat of it was now undergoing decompoſition. We do not therefore find that there was any need of a foreign poiſon to excite this inflammation in a ſore or wound, with conſtitutions in ſuch high ſtates of excitement as our patients have been found. The future progreſs of the ulcer, till the ſloughing and fever are finiſhed, is only this courſe in a larger ſcale. It ſeems in its genius, as an ulcer, what the endemic of the Weſt Indies is, as a fever; the ſtages of high excitement and exhauſted ſenſorial power follow one another ſo quickly, that we have ſcarcely time to mark where the one finiſhes and the other begins. We are not diſpoſed at preſent, however, to offer theſe ſpeculations as a theory of the malignant ulcer; we have thrown them out rather with a view to excite future inquiry, than to reſt ſatisfied with the knowledge we poſſeſs on the ſubject.

There is another curious peculiarity I have forgot to take into the account of this ulcer; it is, that on whatever part of the body we have ſeen it, it never ſpreads in the form of abſceſs containing matter in a diſtinct ſac, but conſtantly proceeds, by haſty ſtrides of ulceration, exhauſting and conſuming the ſenſorial power of the parts, till it bring them to final decompoſition; and when this is completed, the ſurface is in colour very florid, or appears what has been expreſſively called an *angry look*, with a complexion diametrically the reverſe of the ſcorbutic ulcer.

TREATMENT.

Mr. Cruickſhank at Woolwich, following the example of Dr. Crawford on cancer, has made experiments, as tranſcribed, on the diſcharge of the ulcer in the hoſpital of the Royal Artillery. Theſe, we have no doubt, were conducted with the uſual addreſs of the able experimentaliſt: but we are not to expect that the moſt accurate analyſis could develope its qualities. The matter of every ſore receives its properties from the living ſurface which ſecrets it, if unmixed with the fluid which comes from a lifeleſs ſlough not quite ſeparated. The chemiſt therefore diſcovers little elſe but what is common to it with dead animal matter. When the living principle is once extinguiſhed, the *fine, immaterial repreſentative of the Divinity*, where is that Promethean heat to be communicated to the Alembic, or the chemical teſt of affinities, that can diſcover the nice dependencies and exquiſite changes which matter receives from it, as the prime mover of every action and appetite?

Whether this ulcer be contagious or not, it is a point decided in practice, that the ſick berth of a man of war is a very improper ſituation for ſuch ſubjects. The attentive ſurgeon will therefore mark its early diſpoſition to malignity, and ſend his patient to an hoſpital on ſhore, if this be in his power. We might have mentioned in its proper place, that one of the ſtrong arguments in favor of its infectious nature is drawn from the diſeaſe running its courſe in particular ſhips, while others are entirely free. But it is not always to be demonſtrated by what means one ſhip remains healthy, while another ſuffers from diſeaſe, no more than we can aſſign reaſons why a ſingle perſon becomes ſubject to diſeaſe, and another not. In the preſent caſe it ſeems ſufficiently clear, that a number of men living in one ſhip, accuſtomed to the ſame modes of diſcipline, and nearly of the ſame age, feeding on the ſame kinds of proviſion, or with leſs variation than in moſt other ſituations of life, are very likely to be attacked with diſeaſes of a congenial nature. Thus we ſeldom ſee ſolitary caſes of fever, dyſentery, catarrh, pneumonia, and opthalmia in ſhips; nay, for theſe reaſons, ſcurvy itſelf has by ſome authors been called infectious, by overlooking cauſes that were general in their operation. The effect of imitation is perhaps more conſpicuous among ſeamen than any other deſcription of mankind: they go early to ſea, and as they have fewer changes of object to behold, the manners, motions, and geſtures of the elder are quickly copied by the younger. If, therefore, the propenſities in health be ſo ſtrongly marked, why ſhould not the ſympathies in diſeaſe be of a kindred nature? We are zealous to throw out all theſe hints, as it was never remarked in the Meduſa's hoſpital, though the different caſes of ulcer were mixed as they came on board, and many of the worſt kind that has been known, that any patients from other ſhips were tainted by infection. The common large ſores in general healed faſt; and ſome cicatrized in the ſhort ſpace they remained with us. In the naval hoſpitals there has not occurred one ſingle inſtance of infection from any ulcer that has been ſent on ſhore, as far as we have been able to learn; and which would appear an *argumentum crucis* againſt its contagious nature.

We ſee from Dr. Rollo's practice, that it was the firſt object to deſtroy the diſpoſition of the ſuppoſed morbid poiſon in embryo. This practice was more or leſs ours, though we ſuſpected no ſuch diſpoſing cauſe as he aſſigned; and we were directed to do this, merely from the change of appearance on the ſurface of the ſore, to excite the veſſels to a healthy ſecretion, and to facilitate the ſeparation of the ſlough. Our ſucceſs, however, was not the ſame: in our patients there ſeemed ſo ſtrong a tendency to inflammatory action in the part, that the application of the nitrate of mercury, even in the very early ſtage, appeared to do much harm. In one caſe, on the under part of the fore-arm, with a view to ſeparate the *black ſpot* at once by this remedy, ſo extenſive and alarming an inflammation followed, that I attributed much of the miſchief to the ſtimulus of the metallic ſalt.

In the *ſecondary ſloughs*, I mean ſuch as appeared after the violent fever and inflammatory ſymptoms were gone, the uſe of theſe eſcharotic applications was ſingularly exemplified. But the body was now reduced and emaciated, and could bear local and general ſtimulants not only with impunity, but with advantage.

In ſuch a habit of body as we have deſcribed above, large evacuations in the firſt ſtage may certainly be ſafely employed. We would recommend general and topical blood-letting to be entered upon with all the earneſtneſs imaginable; but blood taken from the ſpot, if practicable with cupping glaſſes, will be a preferable mode of quickly emptying the neighbouring veſſels. Theſe might be repeated in a few hours, till the pain and inflammation are completely ſubdued. This ſeems to be the period which, if improved, will ſave the patient uncalculable torment; for the ſize of the ſloughs, and the ulcerated ſurface that follow, are in exact proportion to the preceding inflammation and fever. Expoſing the limb above the bed-clothes, with only a piece of thin linen over it, and keeping it conſtantly wet with cold water, would ſeem to be the beſt topical application. The cold produced by the evaporation of the fluid will aſſiſt in diminiſhing the action of the blood-veſſels, and, by leſſening excitement, will eaſe pain, and contribute to the reſolution of the whole. Along with theſe external means, we would recommend total abſtinence, or only the uſe of weak watery drinks, ſuch as water gruel or tea. Very briſk purges, which induce ſudden depletion, muſt form a part of this plan; ſuch as a pill of five grains of calomel, waſhed over with four ounces of the tartariſed infuſion of ſenna. This ought to produce ſix or eight evacuations by ſtool, in the courſe of twenty-four hours; otherwiſe it ſhould be repeated.

The whole of theſe means muſt be ſedulouſly employed till the fever, redneſs, and heat of the part, as well as the pain, entirely ſubſide.

If, however, theſe ſhould fail in producing a perfect ſolution of the diſeaſe, they will at leaſt mitigate the ſymptoms, and leſſen the evil. This being the caſe, the nature of the pain, with the complexion of the affected ſpot, and with the degree of fever preſent, will indicate to the attentive obſerver when a change of treatment becomes

neceſſary.

neceſſary. Warm fomentations and poultices will therefore be required, and recourſe to half, or perhaps more of the uſual diet, muſt be had.

Opium, during the inflammatory ſtage, is heaping fuel on fire, will increaſe the pain, and add to the febrile heat: it ought never to be reſorted to in this condition. But when a benign pus is wanted, and when the pain and reſtleſſneſs ariſe more from the gangrenous maſs beginning to ſeparate, and the exquiſite ſenſibility of the new ſurface, from deficient ſtimulus, then opium will be found to poſſeſs its due effects, and reſumes its ſovereign power to aſſuage pain and procure ſleep. Whenever a ſore is in want of ſtimulant local applications, which experienced ſurgeons better know than can be deſcribed, then alſo the aſſiſtance of opium inwardly, ſhould go hand and hand with the external means the ſurgeon may uſe: the propriety of the practice is beyond a doubt; we ourſelves have witneſſed its wonderful powers on numerous occaſions, when bark and wine failed.

With reſpect to the ſeparation of the mortified, and mortifying maſs which we expect to fall off, great attention is required in the poſition of the limb or poſture of the body, to prevent it from irritating the tender ſound parts, either by preſſure upon them, or by its pendulous ſituation putting the fibres on the ſtretch. The ſcarificator has probably been often raſhly employed at this time, with a view, as has been ſaid, to make the ſound throw off the decayed portion. The beſt practice which we have ſeen is to leave this part of the buſineſs to nature, and to direct our attention to keeping the parts clean and free as poſſible from the maſs that is undergoing decompoſition. The limb or ſore, therefore, ought to be very frequently, ſometimes every two or three hours, bathed and waſhed clean, with water about blood-heat: and ſhould people be fond of adding odoriferous herbs, they may, if they pleaſe, mix roſemary, ſouthernwood, &c. in ſmall quantity, ſo as not to hurt from their acrid quality. At this time, and at all others, the lighteſt dreſſings are beſt.

When the ſloughs were thoroughly ſeparated, we have not always found the ſurface like that of a common ulcer, and to be healed by the ſame means. The denuded muſcle in a ſingle night has ſometimes aſſumed, what we have above called an *angry look*, from having no better term to expreſs it with. It conſiſts of a florid complexion, with ſtrawberry-like granulations, that ſpring from a narrow root, and the edges of the ſore ſerrated: with theſe looks the ſore never yielded matter ſufficient to allow of the ſpontaneous ſeparation of the dreſſing; and the removing them was attended with exquiſite pain. Diluted ſpirit or tinct. myrrh. was ſaid by Mr. Galloway, one of our aſſiſtants, to anſwer beſt as a topical application, but opium was given liberally at the ſame time. If the ulcers were ſituated on a fleſhy part, theſe florid granulations would remain a few days; but if near the ſurface of a bone, their duration was ſhort, and with their falling off or abſorption, the perioſteum ſeparated, leaving the bone expoſed, which in its turn was diſpoſed to caries.

At this ſtage, and the ſore throwing off large maſſes of corrupted matter, and generally a vaſt diſcharge, at the ſame time a diet, cordial, nouriſhing, and ſtimulant, is now of the firſt importance. Few hoſpitals could preſent ſuch a bill of fare, in this branch of the Materia Medica, as was found in the lower deck of the Meduſa: but ſurgeons in private ſhips muſt do the beſt they can, and our officers have uniformly ſhared liberally from their tables to the ſick.

The contents of the following Eſſay, communinicated to us by Vice-Admiral William Young, one of the Lords Commiſſioners of Admiralty, we think a valuable addition to the ſubject which we have been treating, and will be highly acceptable to the navy ſurgeon, from the reſpectable authority of its author.—On the Uſe of the Gaſtric Juice of Gramenivorous Animals in the Cure of Ulcers, by Dr. John Harneſs, phyſician to his Majeſty's fleet in the Mediterranean.

" Mr. Thomas Corben, boatſwain of his Majeſty's ſhip the Egmont, was, on the 31ſt of July, 1796, received into the Dolphin hoſpital-ſhip, with a ſcorbutic ulcer on the right leg, the external ſurface of which was ſix inches in length, and four in breadth. The ſurrounding integuments were detached to a conſiderable diſtance, and their margin, with the much greater portion of the ſurface of the ulcer in a ſphacelous ſtate. The diſcharge was ſo acrid as to deſtroy every part it came in contact with, and it had inſinuated itſelf through the whole length of the gaſtronemius and ſoleus muſcles. From between the muſcles which were detached from the bones, nearly the whole length of the ulcer, a very large quantity of moſt offenſive matter was diſcharged; a conſiderable portion of which lodged in a cyſt, formed by the detached integuments on the exterior and inferior part of the leg. There was very great tenſion of the whole length of the extremity, and the patient's general health was much impaired.

"In the courſe of a long and extenſive practice, I had been too frequently a witneſs of the inefficacy of the applications hitherto commonly made uſe of, in the treatment of ſcorbutic; ſuch as citric acid, Peruvian bark, myrrh, rhubarb, opium, &c.: and I had more particularly found them inefficacious in warm climates, when eroſions and ſphacelus had taken place to any conſiderable extent, which every ſeaman, laboring under ſcorbutic diatheſis, is particularly ſubject to from the ſlighteſt occaſional cauſes, and which have, in innumerable inſtances, unavoidably terminated in amputation or death *.

"From

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* It does not appear from the deſcription here given by the ingenious author, that this caſe was a ſcorbutic ulcer. *Vide*

" From the very unfavorable appearance of this caſe, and from being perſuaded that it would be found impracticable to effect a cure by any of the above-mentioned remedies, in which my own opinion was corroborated by that of Mr. John Gray, a very ingenious practitioner, and ſurgeon of the hoſpital-ſhip; I was induced to have recourſe to the gaſtric fluid of graminivorous animals, which I knew could be eaſily obtained from the bullocks and ſheep daily killed for the uſe of the fleet. A bullock being killed in the evening, near three pints of the fluid were obtained, with part of which the ſurface of the ulcer was waſhed, as were the whole of the ſinuſes, by injecting the fluid with a ſyringe. Superficial dreſſings of lint were then applied, and particular attention was paid to the application of bandages and compreſſes, that they might, as much as poſſible, prevent a

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Vide Lind's definition in his large work on "Scurvy." We hold it to be a point fully eſtabliſhed in practice, that a liberal uſe of the lemon will *always* correct and alter the diſpoſition of a ſcorbutic ulcer, without the aid of local applications of the acid, which we think ſuperfluous. The ſore may not heal by theſe means, but it will aſſume a new character, and the future treatment muſt be regulated by circumſtances, and rules ſufficiently underſtood by the practical ſurgeon. The qualities of the *ſuccus gaſtricus* being well known, from the experiments of Spallanzani and others, we are led to infer, that on the ſurface of ulcers it exerts a ſtimulant power, being acid and corroſive: the ſtrength, however, muſt vary in proportion to the long faſting of the animal from whoſe ſtomach it is taken.

further inſinuation of matter, as well as for the purpoſe of bringing and preſerving the parts as much in oppoſition as their diſeaſed ſtate would admit of, that every advantage might be derived from the adheſive inflammation, which I expected this application would excite.

"The third day after this application was begun, upon removing the dreſſings, the whole of the ſphacelated parts came away, and expoſed a large portion of the tibia, in two different places. To theſe pledgets of lint, dipped in the fluid, were applied, which not only appeared to prevent the injuries uſually attendant on theſe caſes, diſcolouration and exfoliation, but, on the contrary, in the courſe of eight days, the parts thus expoſed were covered with granulations; and at the expiration of fourteen days, the whole of the ſoft parts were perfectly re-united, and the ſurface of the ulcers reduced to a ſore of about two inches and a half diameter, with granulations, ſmall, compact, and of a beautiful florid colour. It is now, Nov. 10, perfectly healed, and the patient, although a very luſty man, enabled, by the aſſiſtance of an elaſtic bandage, to attend the duties of the ſhip.

"After the three firſt dreſſings, the gaſtric fluid of the ſheep was uſed; from the ſhip's being at ſea, we were not enabled to obtain any from the bullocks.

"To remedy this patient's ill health, an aperient medicine was firſt given; after which he was directed to take half a dram of Peruvian bark in two ounces of the decoction every ſix hours. He was at the ſame time directed to make uſe of as many lemons and onions in the courſe of the day, as his ſtomach could eaſily bear. It was aſtoniſhing to obſerve with what rapidity he gained ſtrength, after the ſphacelated parts were thrown off.

"Since this trial I have had the ſatisfaction of finding the gaſtric fluid ſucceed in more than a hundred inſtances, where ſphacelus had occurred. And the teſtimonies of its peculiar good effects, in ſimilar caſes, by Mr. Jones, ſurgeon to the naval hoſpital at Baſtia, and by Meſſrs. Read and Buck, two of his principal aſſiſtants, convince me of the propriety of making its efficacy generally known.

"I have at preſent a patient in the Dolphin, a ſeaman belonging to the Barfleur, who, by long confinement in bed, in a typhus fever, became excoriated in three different places, which all terminated in extenſive mortifications. The ſphacelated parts in this caſe were entirely removed by the application of the gaſtric fluid; and the patient is now ſufficiently recovered to walk about.

"*Mediterranean, Nov.* 10, 1796."

A few trials of this practice were made on board the hoſpital-ſhip Meduſa at ſea, on our ulcers, by the gaſtric juice of the ſheep that had been killed for the uſe of the ſick; but too ſmall a quantity was obtained at a time to give it a fair chance of ſucceſs. We however hope, that when opportunities may offer, the ſurgeons in the Channel will not fail to have recourſe to this approved method of treating foul ulcers.

The following communication is extracted from a letter to Dr. Garthſhore, from Mr. Hammick junior, of the Royal Hoſpital at Plymouth. We quote it with the more pleaſure, as it comes from among ourſelves, and has been laudably employed for the relief of our people. The author has been lately known by his experiments on the nitric acid in the cure of lues venerea. With much ſatisfaction we receive every improvement that originates in a naval hoſpital: it is the firſt field that we are acquainted with for obſervation; and we ſincerely wiſh that the inquiring genius of Mr. Hammick may be generally imitated by his peers.

"Having obtained permiſſion from Dr. Geach, ſenior ſurgeon of this hoſpital, whoſe kindneſs and excellent advice I experience on every occaſion, to make trial of common hops in thoſe wards which I attend as his aſſiſtant; I have now the ſatisfaction of declaring, that during the laſt ſix months I have ſeen very good effects from hops in poultices and fomentations, applied to ulcers of the worſt kind, in more than ſixty patients received from the ſhips of war into this hoſpital. Some of the ulcers proceeded from ſcurvy, and ſome from other cauſes. But though all of them have been ſordid, fetid, and extenſive, yet the fetor has ſoon been corrected by theſe applications, and the ulcers have ceaſed to ſpread.

"A large handful of hops are to be boiled in a quart of water, till a ſtrong decoction be formed. Oatmeal with lard or oil is then to be mixed with the hops and the decoction, till the poultice become of a proper conſiſtence. The poultice is then applied to the ulcer without any intervening lint. But previouſly to this application, the ulcers are directed to be well fomented with the decoction. The pain proceeding from the ulcers is ſoon alleviated, and the ulcers themſelves ſoon ceaſe to ſpread. They become clean, and in a ſtate to be dreſſed with lint or any ſoft ointment.

"As I do not know that hops in the cure of ulcers have ever been recommended, and as I am deſirous that the uſe of this application ſhould not be confined to this hoſpital, I beg you will honour me ſo far as to communicate this report to any of your learned friends, who may be induced to bring this practice to the teſt of experience, and to extend it ſtill farther."

P. S. Mr. Moffat's laſt communication to me was about the end of October. In this he ſays, "It is with pleaſure I acquaint you, that the ulcers formerly noticed, have received a very ſenſible check from the cold weather lately ſet in; previous to which it had exceeded its uſual virulence, almoſt beyond belief. Wherever the ſkin was broken, whether by bleeding, bliſtering, accidents, or any other means, an in-

"flammation and violent fever ſoon commenced, "eating away the ſurrounding ſoft parts to an "immenſe extent, and in depth only ſtopped by "the bones. Fifteen were ſent to the hoſpital-"ſhip at Cork, and three more will be ſent on "ſhore to Plymouth; which are the only bad "caſes theſe three weeks.

"I ſtill perſevere in the antiphlogiſtic plan: "but I muſt confeſs that, till aided with a cooler "ſtate of the atmoſphere, nothing availed much. "I am uncertain whether I ever obſerved that a "conſtant reaching to vomit almoſt always ac-"companied the inflammatory ſtate. December "8th; no freſh caſes."

Mr. Carter of the Glory, on the date of the 3d of December ſays, "My ulcers now look "clean and healing; few freſh caſes for ſome time "paſt; and the diſpoſition quite changed from "what it was in the ſummer months. I received "great benefit from calomel." It is, however, to be obſerved, Mr. Carter's caſes were in general leſs violent than in the Royal Sovereign and Triumph.

Dr. Browne of the Royal Sovereign, December 4th, ſays, "My ulcers are certainly better, which "I am inclined to impute to the change of wea-"ther, as my friend Mr. Moffat has done." He, however, found them become worſe as freſh proviſions were done, at ſea; this had been only from the want of due ſupport during the debilitated ſtate. The doctor adds, that he had received very great benefit from calomel and antimony in the ſphacelating ſtage. He has ſtill nine ulcers, but only one confined to bed.

Theſe accounts all agree in one thing, to wit, benefit from a cool atmoſphere; and this throws conſiderable light on the nature of the ulcer in its firſt ſtage, and ſupports the opinion moſt approved in the practice at the early commencement of inflammation.

MEDICINA NAUTICA.

EXPERIMENTS ON THE NITROUS GAS OF DR. J. C. SMYTH:

Effect on Ulcers—on Blood and Animals.—Curious Particulars in diſſecting a Cameleon killed by this Vapor.—Inefficacy of the Gas in deſtroying a Contagion on board the Centaur:

By Mr. JAMES REILLY,
Surgeon of his Majeſty's Ship Prince.

ON the 10th of November an opportunity offered of trying the effects of this grand ſpecific on ulcers, which I moſt eagerly availed myſelf of, by expoſing the ulcers to the influence of the vapour, after previouſly cleanſing them. I ſhall take the liberty here of mentioning the ſpace I tried the experiments in, which was the ſick-berth of his Majeſty's ſhip Prince, thirty-two feet long, eleven feet wide, and ſix feet ſix inches high, and at the ſame time particulariſe ſome few of the caſes at the time of their reception in the berth for cure, as well as the number of pipkins I employed daily.

Thomas Hammond, a ſeaman, aged about thirty years, was admitted for cure on the 10th of November. He had at that time an ulcer on the poſterior and inferior part of his right leg, extending about two inches by an inch and a half, with a thin ſanious diſcharge.

Edward Gleeſon, a ſeaman, aged about twenty-eight years, for an ulcer on the ſuperior and anterior extremity of the tibia. This ulcer originated in conſequence of a ſcratch he had received about ſix weeks before. At this time the diſcharge was thin and copious, in which ſtate it had been for the ſpace of a fortnight prior to his reception in the ſick-berth.

John Woodman, a boy about fifteen years old, for an ulcer on the maleolus internus of his right leg, which extended about four inches in circumference. This ulcer degenerated from a wound that he had received about three weeks before.

Edward Colly, a ſeaman, aged about thirty-five years, for an ulcer on the anterior and inferior extremity of the tibia. This ulcer he got when his Majeſty's ſhip L'Eagle was loſt on Plane Iſland off Cape Farina on the 18th of July 1798, by being driven on a rock. At this time it was ſuperficial, with a ſlight degree of inflammation.

Matthew Bendall, a marine, aged about twenty-five years, with an ulcer on the ſuperior extremity of the tibia. This ulcer was extenſive, with a thin ſanious diſcharge; but the man of a healthy robuſt habit.

After collecting the men with ulcers in the berth, I lighted three pipkins, the vapour of which I did not find adequate to the ſpace; after which I lighted five every morning, and repeated them twice, which completely filled the berth with the vapour for the ſpace of fifteen minutes, where I had all the ulcers expoſed. After fumigating, I obſerved a ſlight diſcharge, from each of the ulcers, of a yellow colour. The men attending the pipkins, if they unguardedly opened their mouths, it excited coughing, and very often ſneezing. One of the aſſiſtants in the berth had a bird, which I begged he might allow to continue during the time of fumigating. The poor bird was ſadly agitated all the firſt morning, but felt its effects leſs daily. On the 11th, it had the ſame effect on the ulcers as on the preceding day, with nearly the ſame on the bird and aſſiſtants. On the 12th, I took with me to the berth a boy belonging to one of the people, about five years old: after I gave the boy a handkerchief to ſtop his mouth and noſe with, he thought it good ſport, and daily ſolicited for leave to go, as he was pleaſed to call it, to fight the Spaniards. The ulcers this day produced nothing ſingular in their appearance. On the 13th, I remarked, after fumigating, that my hat was of a violet colour, in which ſtate it remained for nearly an hour after, but on wiping it with a towel, and expoſing it to the air, I found it return nearly to its former colour. Black cloth it changed and French blues very materially; but the hats, after being five or ſix mornings expoſed to the vapour, were left worth nothing. On the 14th I obſerved Bendall's leg different to what it had been on the former days, with a ſlight degree of inflammation: the boy and bird, as well as the other men, apparently felt its effects leſs every day, but always with pleaſure extended their lungs at the free admiſſion of atmoſpheric air. On the 15th the ulcers continued as on the preceding day. On the 16th, all the ulcers, except Bendall's, appeared ſtationary, but in his the inflammation daily increaſed. On the 17th, the inflammation increaſed ſo much in Bendall's leg, that I was obliged to have recourſe to emollient and cooling applications, forbidding his attendance in the berth until ſuch time as the inflammation ſubſided. On the 18th, Gleeſon's ulcer appeared much inflamed, which inflammation extended to every part of his leg. Him I had alſo to caution againſt attending until ſuch time as the inflammation abated. On the 19th, I expoſed blood to the vapour, and at the ſame time expoſed blood to the influence of atmoſpheric air. On comparing the blood expoſed to the vapour with that in the open air, I obſerved the blood in the open air to be two ſhades lighter or more florid than that expoſed to the vapour. At this time the thermometer was at 60; the ulcers, except Bendall's and Gleeſon's, ſtationary; the boy I obſerved to have a degree of ſtupor on him, with a loſs of appetite; the bird, which was a chaffinch and of handſome plumage, now became nearly of a dark blue colour, with a diminution of ſize. On the 20th, I inflated the lungs of a goat with a ſmall portion of the vapour joined with atmoſpheric air, without having had a more ſenſible effect on the animal than that of inducing drowſineſs. The ulcers continue ſtationary, except Bendall's and Gleeſon's; the boy drowſy, and the bird daily became bluer, and diminiſhed in ſize. This day I tried its effect on blood, which produced ſimilar to that on the preceding day: thermometer at 59. On the 21ſt, 22d, and 23d, I tried my experiments as on the preceding days, which produced ſimilar effects. By this time, with the uſe of emollient cataplaſms and an antiphlogiſtic regimen, Bendall's and Gleeſon's ulcers were well enough to be re-admitted. On the 24th, Colly's leg, and Hammond's, were much inflamed, and their ulcers increaſed in ſize. On the 25th, the inflammation increaſed to a very high degree in Colly's leg, and Hammond's. My experiments on the blood and goat were as on former days. On the 26th, every thing appeared as on the 25th. On the 27th, all the ulcers appeared to ſpread with a conſiderable degree of inflammation, with a quick ſmall pulſe and apparent ſymptoms of indirect debility on the men, as well as the loſs of their uſual healthy colour; the languor increaſed ſo much on the boy, that I could not with ſafety bring him with me any longer; the bird decreaſed in ſize, and aſſumed a darker blue; the blood as on former days. On the 29th, the ulcers increaſed in ſize, and the men became more debilitated. On the 30th, John Woodman, in holding one of the pipkins, applied the vapour too cloſe to his leg, which excited a violent degree of inflammation, but with the frequent uſe of emollient cataplaſms, the inflammation ſubſided, and the ulcer healed over by the 10th of December. I beg leave to remark that this is not an uncommon occurrence in indolent caſes, for I am ſatisfied that four times out of five, if no prediſpoſing cauſe exiſt in the habit, that the application of cauſtic to ulcers will produce a cure, which acts in a ſimilar way by inducing an increaſed excitability of the part. All the other men continue worſe, their ulcers increaſe in ſize and themſelves in debility, which obliged me, on the 12th, to leave off fumigating.

About the time I commenced my experiments, Mr. Pritchard, maſter of his Majeſty's ſhip Prince, preſented me with a cameleon, that had been ſent him by a gentleman from Saffia in Barbary, which extraordinary production of Nature I remarked with particular attention every morning after fumigating. On the admiſſion of atmoſpheric air I had this animal brought into the berth, and as regularly obſerved his colour change to a variegated black, which in no ſmall degree excited my curioſity: unthinkingly, I one morning allowed it to remain in the berth during the fumigating proceſs, which, I am ſorry to ſay, ended its exiſtence. I found, when it was dead, its colour was black, the reaſon of which I ſhall attempt to explain. As this animal is not known in England, I examined the comparative anatomy of the thorax and abdominal viſcera, theſe being the only parts I diſſected, having ſtuffed his body: which will fully account for the ſingular phenomenon that takes place in its changing to the ſame colour with the object placed before it. On opening to view the thorax and abdomen, there appears no mediaſtinum, but a thorough communication, without any intervening ſubſtance; the whole ſpace of which is filled by three bladders, the middle and ſmalleſt of them may be called with propriety the æſophagus and ſtomach. It is firmly attached to the os hyoides, and terminates in the anus. The other two bladders are attached to the thrahea, and in every reſpect perform the office of lungs. And the animal can at diſcretion fill itſelf out to a large ſize, by inflating theſe veſicles, which are extremely pelucid, and, when inflated, fill completely the whole of the abdominal cavity; where there is no other ſubſtance but theſe tranſparent membranes. And the change of colour that takes place is occaſioned by the reflection of any other colour on theſe tranſparent membranes, as the ſkin of the animal is extremely thin, and between the cellular ſubſtance and the ſkin is a filamentary expanſion of the membranes; which pellucid or tranſparent membrane ſerves as a lens or mirror to reflect the rays of colour when objects are placed before it. A very clear demonſtration of this is, that when a collapſe takes place, which is not unfrequent, it is not influenced by colour; and on the contrary, when theſe bladders are full, its colour is influenced by the object placed in competition, but ſcarlet more particularly from its being more vivid. I doubt much whether Nature has deſigned this animal to live on food or not, from the following circumſtance; that I very frequently gave it flies, which it never appeared to ſwallow with avidity; and I believe, if it were poſſeſſed of the power of returning them, that it ſhould have done ſo: and in diſſecting it I found the whole of the flies unaltered in this middle ſpace; and as a farther proof, from the part of the cyſt where the flies were, to its termination, was ſo cloſely filled with bezoar-mineral, that the moſt minute ſubſtance could not have paſſed. This, in my opinion, clearly proves that Nature did not deſign it to live on food; or if it had, that its fæces were of the bezoar mineral.

The tongue of this extraordinary animal is ſeven inches long, and in appearance like the ſucker of a pump, with two apertures. The expanſion of the nerves are beautiful, having no muſcular ſubſtance to cover their colour: I counted diſtinctly twenty-nine pair; they in every degree perform the office of muſcles, and all motion is performed by them the ſame as by the muſcles in other animals: the eyes are of a very particular ſtructure; they are very prominent, with a ſmall pupil; and the animal can look forward with one, and back with the other at the ſame time. Its colour, when not influenced by objects, is a bluiſh grey, beautifully variegated with ſmall yellow ſpots; its body about ſeven inches long; its head about an inch and one half, handſomely helmeted; its tail about five inches long, which it makes as much uſe of as any of its legs, particularly when deſcending from heights; it is of the oviparous claſs, reſembles much, only ſmaller and handſomer, the gauana of the Weſt Indies.

In all my remarks on blood expoſed to the vapour, I found it two ſhades darker in colour than the blood expoſed to the influence of atmoſpheric air; and the *craſis* of the blood expoſed to the vapour was at all times deſtroyed. If the thermometer were high, with any thing of a ſmart breeze of wind, the blood expoſed to the influence of atmoſpheric air became three ſhades lighter or more florid than the blood expoſed to the vapour. From theſe remarks we may preſume to infer, that the vapour does not impart oxygene to inorganic bodies; and the effects produced on the boy and the bird clearly prove that it does not impart oxygene to the organized fibre: and the debility induced on myſelf as well as the men, with the death of the cameleon, plainly prove it inimical to animated Nature: for although I have not mentioned it in the former part of this narrative, yet I felt, after the firſt fortnight's attendance, a very unpleaſant languor on me, with a loſs of appetite, and a depreſſion of animal ſpirits. So apparent was this ſtate marked in my countenance, as well as my feeling very ſtrongly its effects, that the gentlemen of the ward-room frequently remarked to me the change produced in my appearance, and as often requeſted me to ſuſpend the fumigating proceſs. This I certainly ſhould have done, had it not been for the preſſing ſolicitations of ſome of my medical friends, as well as my own great wiſh to be in poſſeſſion of facts that ſhould enable me to decide on the virtues of the vapour; in every one of which I found it fall far ſhort of the wiſhed-for effect; and in no one caſe of ulcer did it produce ſalutary effects, but, on the contrary, appeared to do great miſchief.

Mr. Reilly concludes his communication with ſome remarks on the inefficacy of fumigation in deſtroying contagion on board the Centaur. This ſhip was lately commiſſioned, and carried, from the coaſt of Ireland, where ſhe had been cruiſing, an infectious fever. She ſailed from the coaſt of Ireland with Sir Roger Curtis, whoſe ſpeedy junction with Lord St. Vincent, on the 25th of May, enabled that great commander to diſpatch other ſhips to join Lord Nelſon. All the uſual routine of fumigation was practiſed in this ſhip; the very hold was unſtowed and cleared for the purpoſe. Nor was it ſubdued before the month of Auguſt, which was at laſt effected by a freſh ſupply of cloathing and bedding; and all the old wearing-apparel of the people was not only waſhed, but boiled in water.

The advocates for the uſe of *unreſpirable gaſes* muſt bluſh, when they ſee the buſineſs of purification thus taken out of their hands; and their practice, when adhered to, made an engine of torture among a ſhip's company. With ſuch examples before their eyes, we truſt officers will diſclaim the ſurrender of their fine diſcipline for the *monſtrous quackery* of any fumigating proceſs *.

We read with delight the kind regard for the health and comfort of the fever patients, beſtowed by Captain Markham in this ſickly ſtate of his ſhip, by ſupplying them with all the dainties of his table.

P. S. It is to be obſerved that Mr. Reilly's trials of the nitrous vapour, as well as thoſe of Dr. Browne in the Royal Sovereign, and Mr. Moffat in the Triumph, were made in conſequence of a letter from Mr. Paterſon being circulated in print by the Commiſſioners of Sick and Wounded throughout the navy. We might have been content that theſe trials fully *confute* the practice; but that letter being now publiſhed, and accompanied with an introduction that magnifies its importance, in Duncan's " Medical Annals for 1798," we think it proper to guard our ſurgeons againſt ſome of its arguments.

This gentleman ſpeaks of fumigation and ventilation in the ſame breath; and adds, that the one will not do without the other. Here at once is the groſſeſt miſapplication of principle and language; for by ventilation you admit pure air, and by fumigation

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* In this inſtance it is but fair to conclude, that the infection was *prolonged* by the diffuſion of *poiſonous airs*, from fumigation, in a ſeaſon and climate otherwiſe ſo favorable for ſubduing it.

gation you introduce foul air. Mr. Paterſon ſays he found the nitrous vapour pleaſant: chemical authorities ſay it is "deſtructive to animals." Cleanlineſs he alſo admits to be uſeful: now cleanlineſs and nitrous vapour are in direct oppoſition: for chemiſts ſay nitrous gas deſtroys the texture of all *animal ſubſtances* uſed in cloathing, and decompounds the wool, ſilk, hair, and the colouring matter. Mr. P. did not perceive his cloathes affected; but Mr. Reilly obſerved, as all chemiſts have done, that the colour of his hat and other articles were altered by the vapour. Mr. Paterſon is in hopes that my "*ill-grounded fears*" will be now removed. Mr. P.'s letter has deeper rooted my diſlike to the practice; for there is not a clear fact in the whole performance. We ſhould like to have ſeen this report dated officially from Forton Priſon. Has Mr. Paterſon heard the *doubts* entertained on the ſubject by his coadjutors there?

We have a right to expect that nitrous vapor may occaſionally be a very uſeful ſtimulant to indolent ulcers, like the diluted acid mentioned by Mr. Home; and here we think Mr. P. ought to have pauſed, rather than introduced an unmeaning *eulogy* on a medicine, whoſe exhibition has not yet, even by its warmeſt ſupporters, been defended on either medical or chemical principles.

There is ſomething extremely cruel in diffuſing this gas among a number of men debilitated by bad ulcers in a confined ſick-berth: yet to excite coughing, and in ſome inſtances vomiting, are not deemed ſevere, when compared with the good effect of deſtroying a bad ſmell.

We have juſt been informed by Sir Roger Curtis, under whoſe flag Mr. Reilly is ſurgeon, that if the experiments had not been given up, the patients and experimentors muſt have quickly periſhed.

We, however, think that practice the beſt where the hepatic gas and hepatiſed ammonia are prevented from accumulating, by perfect cleanlineſs, frequent dreſſings, ablution, and pure ventilation. When theſe are earneſtly attended to, nothing very offenſive can be produced.

In the ſame letter we obſerve an alluſion to a medicine called *acetum nitroſum*, a ſolution of ſalt-petre in vinegar. The original introduction of this medicine was in Mr. Paterſon's Treatiſe on Scurvy.

The practice is defended on the theory of the "*privation of oxygene.*" But the ſucceſs here narrated is ſo completely repugnant to known experience, that we were led to make further inquiries in the ſhip where the diſeaſe is ſaid to have appeared. I have now the authority of Captain Pendar and his officers to ſay, that they were aſtoniſhed on finding a book publiſhed, with the account of ſcurvy on board the Reſolution, where it was *impoſſible* ſuch an occurrence could take place without their knowledge; and they *never* heard of it before. A ſcurvy, where upwards of 200 lbs. of ſalt-petre were taken for the cure, could not well happen without officers hearing of it! We ſuſpect the miſtake to have originated from the exhibition of the medicine in ſome very ſlight caſes.

Mr. P. in that work ſays his patients recovered ſooner from the acet. nitroſ. than from lime-juice: *credent poſteri?* Captain Charles Rowley was requeſted to certify ſome cures in a ſhip he commanded; but he declined by ſaying, they were cured by refreſhments from his table. This much, in juſtice to ſervice, we conſider our duty to make public.

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MEDICINA NAUTICA.

CASE I.

A large FRACTURE *of the* CRANIUM, *ſucceſsfully treated,*

By Mr. CORNELIUS REYNOLDS,
Surgeon of his Majeſty's Ship Blenheim.

WILLIAM Billingham, boy, aged about fifteen years, falling down a hatchway, fractured the cranium about nine inches in length, commencing at the left pars ſquamoſa of the temporal bone, and extending along the coronal ſuture in a ſtraight line. Upon the os parietale, at this place, the detached pericranium was firſt diſcovered, which being diſſected, and retained by an aſſiſtant, I then obſerved the cranium as if totally ſeparated at the ſuture, and could with my finger trace this chaſm downwards. I immediately purſued with the ſcalpel till I came to the ear. The wound was moſt formidable in its appearance, being on the vertical part depreſſed, much ſhattered, and in its whole length the pulſations of the membranes and brain were unuſually hard. Having diſſected the much-injured pericranium, totally free of the fracture, in all its directions and ſides, I applied the largeſt-ſized trepan on the depreſſed part, and removed that firſt. But as the uncommon length of the fracture totally forbade the removal of the cranium its whole length, and as the magnitude of the ſeparation was ſuch as to allow of the moſt complete exit to any fluid, either from hemorrhagy or pus, that might be judged neceſſary, I applied the ſame inſtrument to the other extremity of the fracture, and removed the piece. A copious hemorrhagy enſued, which I did not endeavour to reſtrain, the boy being of the ſanguineous temperament, and conſiderable concuſſion as well as fracture. The wound was dreſſed lightly; pieces of adheſive plaſter were laid acroſs at diſtances; and a very large cold poultice of oatmeal and a ſolution of ceruſſ. acetat. was laid over the whole. He took an opiate draught and was put to bed. I may here obſerve, that the wound, when cleaned after the operation, reſembled a ſtraight line, with two ovals, one at each end thus, ○————○.

The animal functions are a good deal impaired, breathing laborious, pulſe quick and hard, with ſubſultus tendinum.

Hab. enema aperiens ſtatim. et
mittatur ſang. ad ℥xij.

Bibat ad libitum ex aq. hordeata cum ſucco lemonis recentis ad gratam aciditatem.

2d day. Symptoms are relieved ſince yeſterday; breathing leſs difficult and laborious.

℞ Hauſt. opiatus, hora ſomni
Bibat ad libitum ut antea.

3d. The febrile ſymptoms are abated, though the irritability is ſtill conſiderable: his reſt is interrupted by frequent ſtartings, and during the day he ſeems comatoſe, rather than ſleepy.

℞ Hauſt. opiatus.

Ordered him a little mutton broth, and half a glaſs of wine and water. Dreſſed the wound ſimply, which has begun to digeſt.

4th. The patient begins to ſleep naturally; in ſhort every function is reſuming its natural office. The wound is digeſting kindly: let him have ſimple dreſſings. Ate a bit of mutton for dinner. Continuentur med.

5th. As yeſterday.

From this time no very particular treatment became requiſite, except ſome trifling variety in the dreſſings, as fungous excreſcences, &c. occaſionally preſented.

Whatever may be the reſult time only can ſhow; but at this moment the boy ſeems in every reſpect as perfect in all the ſenſes as he was previous to the accident. The wound is now cicatrized, and pretty well defended by the calloſity of the renovated pericranium: but perhaps a gold or ſilver plate would be advantageouſly applied over the tender ſurface.

Blenheim, at ſea, *Auguſt* 1796.

CASE II.

FRACTURE *of the* RIGHT ARM, AMPUTATION *of the* RIGHT FORE-ARM *and* LEFT HAND, *attended with uncommon Symptoms; with the* SCORCHING *of the* FACE, HEAD, *and* BREAST, *from the Exploſion of Gunpowder; ſucceſsfully treated*,

By Mr. ROBERT DUNN,
Surgeon of his Majeſty's Ship Stag.

Daniel Leary, ſeaman, belonging to his Majeſty's ſhip Circe, was, by the exploſion of a great gun, in the act of reloading, thrown into the main chains, where he was diſcovered in the moſt melancholy plight that ever human being was expoſed to. When called to examine him, both arms appeared to be carried away, with a fracture of the humerus, near the axilla of the right arm: his face, breaſt, and head, were ſcorched all over in the moſt ſhocking manner, and there ſeemed ſcarce any remains of life: in ſhort, ſo hideous a ſpectacle has ſeldom appeared; and under ſuch ſufferings, there were very ſlight hopes that any thing could be done for his relief.

There is ſomething, however, in the worſt of evils, which induces the ſurgeon to ſtand forward with zeal, in ſpite of the moſt diſcouraging circumſtances; and in this inſtance it was rewarded with ſucceſs. While the helpleſs patient continued in a ſwoon, the left hand was removed at the carpus. During this proceſs, ſigns of returning ſenſation were evident; and before the arm was diſpoſed of, he was aware of his ſituation. The arm preſented a moſt awful proſpect, and intereſted me much: for the rational ſtate, which was now every moment increaſing, was an additional motive to perſevere ſtill farther, in hopes of ſaving him.

He was, by this time, thoroughly ſenſible of his miſery, and from the fracture being ſo near the ſcapula, he was told the neceſſity of loſing the arm at the ſhoulder joint. All the violence and obſtinacy which ſeamen exhibit on ſome occaſions, were ſhown by this poor man in oppoſition to my wiſhes; and every intreaty he could uſe was urged in the moſt earneſt manner to ſave as much of the arm as poſſible; or if all would not do, he was content to die in the way he was.

After uſing every argument with him in vain, he became ſtill more unruly, and called for Captain Yorke to aſſiſt him, in ſetting forth his wiſhes. The inconſiſtency of operating below a fracture, and apparently in one of the worſt of caſes, was kindly enforced by Captain Yorke, in addition to every thing I could ſay. But all was of no avail, and without heſitating any longer, it was determined that this pitiable object ſhould be managed in the following manner, although it was tranſgreſſing ſome of the rules of ſurgery. On minute examination of the right humerus, the fracture appeared tranſverſe, without any laceration, or much contuſion, as far down as the elbow. The bones of the lower arm were ſhattered and robbed of all their integuments and muſcles, to within a hand's breadth of the cubitus, where all appeared pretty ſound; and there it was determined to operate.

The ſhock communicated to the veſſels, had prevented any conſiderable degree of hemorrhage all this time; and very ſlight compreſſion by tournequet was uſed during the operation. The bones were found perfectly firm to the ſaw, and four blood-veſſels required ſecuring. The reſt of the operation was ſoon finiſhed, and the arm placed in the eaſieſt poſition, with a moderate compreſſion on the fracture of the upper arm by a tailed bandage. Two grains of opium were given him; cold embrocations were conſtantly applied to the arms, and watched and attended to with the greateſt anxiety. His face and breaſt were moiſtened with oil; his eyes were cloſed, and the head enlarged prodigiouſly: but with all theſe evils, he continued rational in his converſation, and rejoiced that he had not been, what he called, *ſtumped ſhort* in the ſervice.

Every hour increaſed our hopes about him: Captain Yorke and the officers gave him every conſolation by their frequent and attentive viſits, which tended greatly to heighten his natural firmneſs of mind, and to baniſh every thought about his ſafety. Neither hemorrhage or any untoward ſymptom intervened: the left arm was looked at, and dreſſed the third day; was healing without ſuppuration, and ſcarcely any tenſion whatever. The other arm was conſiderably enlarged from the fracture downwards; the outer dreſſings were, therefore, removed, and every thing left looſe about it.

Very little fever enſued, although he was in the moſt exquiſite pain from the ſcorched ſtate of his body. Wine and ſoup were given him in tolerable quantities for three days, when on our arrival at Spithead he was ſent on ſhore to the hoſpital, where, by the active attention and humane care of Mr. Dods and the gentlemen under him, this man was preſerved. In the courſe of two months both arms were completely healed, and the fracture united. In return for the loſs of an eye, with his other calamities, he enjoys a penſion of 20 *l. per ann.* from the cheſt of Chatham, with a cook's berth in a ſhip of the line building.

It ſhould not be unnoticed, that the regard which ſeamen have for each other in diſtreſs was ſtrongly exemplified in this inſtance. No ſooner had the maimed ſailor appeared once more among his ſhipmates, than their zeal to compaſſionate his miſery was ſet forth in their uſual way to render him ſervice. A ſubſcription to the amount of twenty pounds and upwards was collected on board, in a few hours, to which a handſome addition was made by the officers.

Stag, Spithead, Feb. 28th, 1798.

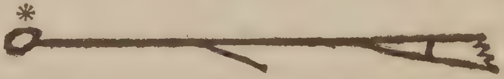
This hardy ſon of the ocean lately paid me a viſit in compliment to the abilities of his excellent ſurgeon. He follows the employment of ſlopman, and attends the ſhips at pay-day, where he outſtrips every competitor in the number of cuſtomers. Though maimed, and blind of an eye, the hardihood of a ſea education is unſubdued by his misfortune. He ſaid, "I ſtill receive king's pay, and am, thank God, hearty and well."

T. T.

CASE III.

Caſe of a FRACTURED SKULL, *ſucceſsfully treated,*

By Mr. R. CARRUTHERS, Surgeon of the Unicorn.

Thomas Cooling, a landſman, aged 21 years, five feet nine inches high, ſlightly made, of a fair complexion, had the misfortune to fall one hundred feet perpendicular, on the 31ſt day of March 1797. He was immediately taken up by ſome of his companions, perfectly ſenſeleſs, and apparently a corpſe, every perſon giving him up for a dead man. I was called to his aſſiſtance, and on my arrival found him ſeized with vomitings and hemorrhagy from his noſe, his abdomen violently contuſed, and a wound on the right ſide of his head; the bigneſs of a horſe's bean of the cortical ſubſtance of the brain was thrown out by the fall, which, as it was wholly detached, I removed gently with my ſpatula: on applying my hand, I found nearly one half of the cranium fractured, and ſomewhat depreſſed, his pulſe greatly oppreſſed, and comatoſe ſymptoms very high. I cut off all his hair, and ſhaved his head, made an inciſion with my ſcalpel from the wound on the coronal ſuture to the lambdoidal, where the fracture terminated, and brought the whole into view (the fractures were not unlike this mark *). He had loſt a great deal of blood from the wound and noſe, which ſuperſeded, for the preſent, phlebotomy. As there was no time to be loſt, I determined upon the operation ſhortly afterwards; applied the trephine at the extremity of the fracture, on the *os parietis* near to the *occiput*, where the depreſſion was; removed the circular piece of bone, and with my elevator raiſed the depreſſed portion of bone and found a quantity of effuſed blood upon the *dura mater*, which I carefully diſcharged; applied emollient dreſſings, and ſecured

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* Where the trephine was applied.

cured the whole by the *grand kerchief* bandage; I adminiſtered an infuſion of ſenna with manna, and a ſolution of natron. vitriol. as by this time he had recovered his ſenſes, ſo as to ſpeak to the attendants about him. From this time to the 4th day of April he remained eaſy and free from any unpleaſant ſymptoms: the draught procured him four purging ſtools, and to my ſurpriſe he voided three long worms of the tenia kind. The 5th I removed the dreſſings, and found a favorable diſcharge of laudable pus. The 8th he paſſed a reſtleſs night, and in the morning found his ſkin very hot, pulſe very quick and full; took away ten ounces of blood, and repeated the cathartic draught. From this to the beginning of September, he got daily better; the cranium had finiſhed exfoliating; and when I ſaw him laſt, the wounds were cicatrized, and as well as if nothing had happened, having followed my directions as to his diet, which conſiſted chiefly of light, thin, nutritious ſoups, obſerving ſtrictly an antiphlogiſtic regimen throughout the whole cure.

Cove of Cork, May 1798.

This caſe was accompanied by a letter from Capt. Young, in teſtimony of the high opinion he entertained of Mr. Carruthers' abilities, humanity, and attention in diſcharging the duties of his ſtation to the crew of the Unicorn.

T. T.

CASE IV.

A Succeſſion of large ABSCESSES *on the upper Part of the* THIGH, *ſucceſsfully treated,*

By Mr. ROBERT CARRUTHERS, Surgeon of his Majeſty's Ship Unicorn.

John Honeyball, a ſeaman, aged 28 years, complained to me, on the 7th of March 1798, of a ſevere pain on the inſide of the right thigh, about four inches below the groin, which he ſays had troubled him for five or ſix days without any known cauſe. He was of a full habit of body, pulſe full and natural, tongue clean, gums livid, and diſcharge blood upon the leaſt preſſure, other functions tolerably good; ſays he had often been affected with lues venerea, and never properly cured; has lived for ſome time paſt on ſalt proviſions; is addicted to all kinds of debauchery whenever an opportunity offers.

Upon examining the thigh a large tumor appeared about the ſeat of the pain; it was greatly inflamed; the heat and throbbing pains were ſo violent as to prevent him taking any ſleep; and it frequently cauſed him to make an hideous noiſe.

I ordered him to be kept to his bed, and a warm emollient cataplaſm to be applied to the part affected, and deſired it to be repeated four times in the twenty-four hours: I adminiſtered one grain of opium every night at bed-time, and gave him an ounce of lime-juice two or three times every day, diluted with water, and ſweetened with ſoft ſugar: no ſymptom of venereal affection whatever has been obſerved on any part of his body.

For ſeveral days the ſuppuration went on rapidly: a deep-ſeated fluctuation was then felt under the ſkin and muſcles, the tumor had increaſed to an enormous ſize, and the cold ſhiverings now became very ſevere: about this time ſeveral ſmaller tumors likewiſe appeared on different parts of the thigh; and notwithſtanding all diſcutients were applied, they advanced greatly in ſize.

I now opened the firſt of theſe tumors, by making an inciſion nearly the whole of its length, and diſcharged about ℔ij. of black, fetid pus, by which he was greatly relieved: digeſtive dreſſings were then applied, and a warm cataplaſm over all. He now took gutt. * * * tinct. opii ph. l. to procure ſleep. In a few days a ſecond tumor was treated in the ſame manner: he took his lime-juice as before directed, and his bowels were kept gently open. His right groin now began to ſwell, and continued to increaſe in ſize for ſeveral days, ſeemingly from the abſorption of the matter from the abſceſſes in the thigh; a great degree of hardneſs prevailed all about the wounds, which now began to contract, although the ſuppuration continued copious. I therefore enlarged them with a probe-pointed biſtoury, and began to give the bark with wine freely. He lived chiefly upon thin ſoups and a vegetable diet, which he received daily from Capt. Young's table. Another large abſceſs now appeared upon the upper part of the vaſtus internus muſcle: it was alſo opened, and diſcharged a lbj of good pus; his allowance of bark and wine was now increaſed, as his pulſe became feeble and very frequent; however, all hardneſs began to diſappear from the thigh, and the cataplaſms were omitted: in a few days ſuppuration likewiſe gradually decreaſed, the tumor in the groin diſappeared, and he now began to recover his natural ſleep and appetite; his pulſe recovered ſtrength daily, and the wounds in his thigh in a ſhort time were cicatrized. He continued to do well, and returned to his duty in five weeks after the firſt attack; and he continues now in perfect health.

R. Carruthers, Surgeon.

Unicorn, Cove of Cork,
Dec. 12, 1798.

CASE V.

Of LOCKED JAW, *from a Wound, communicated in a Letter to Dr.* TROTTER, *ſucceſsfully treated,*

By Mr. RALPH CUMING, Surgeon of his Majeſty's Ship Hind.

" SIR, Bahama, Aug. 5, 1798.

" After peruſing your very valuable and edifying publication, ſtyled MEDICINA NAUTICA, and finding therein that you are deſirous the Navy Surgeons ſhould communicate to you the reſult of their practice in particular caſes, I have tranſmitted you one which occurred on board his Majeſty's ſhip Hind, now employed in America; and I myſelf conceive it to be a duty ſo indiſpenſable and incumbent, that, were we to fail in doing it, we ſhould be unworthy of holding ſo reſponſible a ſituation, where ſo much truſt is repoſed in us, and where the ſafety, welfare, and proſperity of the Britiſh nation in a certain degree hinges. Theſe conſiderations ought to be a ſufficient excitement in us to cauſe our medical communications to become more general, more eſpecially as our practice in the Navy, both in Surgery and Phyſic, is frequently very extenſive, for reaſons the moſt obvious; and as the ſervice has profited ſo much from the preſervation of men's health, and our improved mode of treating diſeaſes, it is to be hoped that our ſituations will be made more eligible and ſuitable to the character we have a right to maintain in the grand theatre of life. And you, Sir, permit me to ſay, are entitled to the higheſt encomiums for your aſſiduous and unremitted attention to the duties of your profeſſion; for I don't know any one who has contributed ſo much towards improvements in our department as yourſelf; and as merit in general rewards itſelf, I truſt yours will meet with the countenance and ſupport it ſo juſtly deſerves.

"*April* 21, 1798. Edward Morriſon, ſeaman, aged 20, in running along the main deck, chanced to ſtep upon an old plank, and run a ruſty copper nail into his foot, between the fourth and fifth metatarſal bones. Two or three days elapſed before he came to the cockpit, when the parts adjacent to the wound were remarkably tenſe, painful, and inflamed. Applied catapl. emoll. quater de die; his foot was previouſly waſhed and ſoaked in warm water, and the callous ſkin well pared. As he complained of conſiderable pain, an opiate was adminiſtered at bedtime. 22d. He paſſed a reſtleſs night, and had much pain and throbbing in the wound. On examining the part, I felt ſome gritty extraneous body oppoſed to the point of my probe. I therefore enlarged the opening, and removed two ſmall pieces of coal. Continued catapl. emol. cum opio hora decub. 23d. His foot was more ſwelled, and that part on the top of it oppoſed to the wound became pointed, which I opened, and gave vent to ſome purulent matter: as he was coſtive, I ordered him natron. vitriol. ℥iſs. et cont. catapl. cum pil. anod. h. s. s. 24th. The ſwelling and inflammation were conſiderably diminiſhed, though his pulſe was frequent, and his tongue furred.—℞ pulv. cort. Per. ℈ij quater de die ſumend. 25th. The febrile ſymptoms increaſed; he complained of racking pain in his foot, and ſaid he felt a creeping ſenſation aſcend from the wound to his ſtomach; his heart and lungs were likewiſe materially affected; reſpiration became difficult, and the pains of his cheſt ſo violent, that deliquium animi, attended with ſpaſmodic twitching, took place. I bound up his arm, and took ℥xij of blood away. After this he breathed a little more freely, but ſtill continued to faint. I preſcribed ſpt. c. c. vol. ʒj. lavend. c. ʒij. aq. menth. pip. ℥iv ſacch. alb. q. s. ad gratam ſaporem m. capt. coch. j. pro re nata: the ſymptoms of tetanus began to advance with haſty ſtrides, and the parts about the maxilla inferior became ſtiff; the patient yawned very much, and deglutition was conſiderably impeded: ℞ opii gr. ij. ſtatim ſumend. the opiate was repeated at intervals, until he had taken gr. vj. He was put into a warm bath up to his chin, where he remained until he was faint; after which he was wiped dry, and put to bed: he now turned ſick, was ſeized with ſyncope, and vomited. I was apprehenſive that ſome of the opium was thrown off his ſtomach by the vomiting. I therefore diſſolved op. gr. ij. in aq. menthæ. pip. which remained on his ſtomach. His Majeſty's ſhip Reſolution being in company, I requeſted of

Capt. Larcom, to ſend for Mr. Porter, the ſurgeon of her, that I might hold a conſultation with him on this unhappy young man. He came on board, and after we had examined the wound very minutely, and obſerving the direction the nail had taken, we deemed it neceſſary to make a bold inciſion right in the direction of the wound, beginning between the fourth and fifth toes. I took a ſcalpel, and carried my inciſion two inches in length, quite through the ſubſtance of his foot, between the metatarſal bones: there was little hemorrhage: the divided parts were inſtantly brought together again; ſoft dreſſings with compreſſes were applied; and the whole retained with a roller: and as cold-bathing has been ſerviceable in the tetanic complaints of tropical climates, we were determined to try its efficacy in this inſtance, as we could not poſſibly have a better opportunity. Three or four buckets of ſalt water were poured over his head, after which he was put to bed quite delirious, and talking very incoherently; the tone of his voice was altered, and the maxilla inferior became exceedingly ſtiff; pulſe frequent and vibrating, with a black fur on his tongue. A cataplaſm was applied round the ancle of the affected foot, with opii ʒj. diſſolved in it. He ſoon became drowſy, and ſlept for four hours, but when he awoke he was ſtill very much deranged, and ſpoke incoherently. His drink was lemonade, and ſago with port wine was given at intervals, which he ſwallowed with great difficulty: his ſtomach was ſo much debilitated that he frequently vomited.

26th. When I viſited him in the morning, I found him perfectly ſenſible, and ſaid his jaw was not ſo ſtiff as it had been. The anodyne cataplaſm was repeated; his foot was eaſy, and free from pain, but much benumbed. He took one cup of tea with a little bread ſopped in it to his breakfaſt; ſago and wine to dinner; and had tea and lemonade to drink. I did not venture to give him an anodyne in the evening, as he ſeemed to be very much ſtupified with what he had already taken, independent of the anodyne cataplaſm round his ancle, which I imagined operated very powerfully. 27th. I found him free from fever, with a gentle perſpiration over his whole body, yet he had a wild frantic look, his tongue was furred and brown in the middle. He complained of great debility; for the weather was very warm, we being cruiſing to the Southward; and his pulſe was ſoft and feeble. ℞ pulv. cort. P. ʒſs 3tia. q. h. ſ. ex. cyath. vin rubr. He now experienced little difficulty in deglutition, the ſtiffneſs of his jaw entirely vaniſhed, and the only pain he had at preſent was about the pracordia, with ſometimes a ſlight pain in his throat. I ordered ſome chicken broth for his dinner, but he did not reliſh it; his ſtomach was remarkably irritable, and could not retain the cortex in ſubſtance, I therefore ordered him the decoction. The pain of his ſide became worſe, which he ſaid was an old complaint owing to a contuſion which he got five or ſix years ago. Appl. empl. veſicat. part. aff. and as he was coſtive, an opening injection was adminiſtered in the evening,

ing, which procured him a plentiful evacuation of indurated fæces; all the ſymptoms of tetanus diſappeared; and the fever ſeemed to be the only malady left to encounter with. The dreſſings were removed; an adheſion of the ſides of the wound had taken place; there was little diſcharge, and the ſmell was not at all offenſive. ℞ Opii gr. ij. hora decub. s. 28th. He had little ſleep during the night; his pulſe was frequent, his tongue foul, ſkin hot and dry with great thirſt. His ſtomach ſo irritable, that it could not retain a few ſpoonfulls of ſago and wine. The decoct. cort. was given as often as his ſtomach would bear it; the pain of his ſide was quite removed by the bliſter, which diſcharged plentifully. 29th. He reſted very little in the night; and when I viſited him in the morning, I found the fever nearly as bad as it had been the preceding day. Cont. Medicam. The wound was dreſſed, and it wore a favorable aſpect. 30th. He reſted better than he had done yet; his ſkin was cool, pulſe ſoft and regular, tongue moiſt; but he ſtill had an averſion to any kind of food. The wound looked healthy, and the diſcharge was good, and in moderate quantity. The decoct. cort. wine, &c. were continued. It is worth while noticing that the decoction remained on his ſtomach, when the cortex in ſubſtance was ſure of being ejected. In the afternoon, at two o'clock, he had a violent exacerbation of fever, and complained very much of his head. He was got out of bed in the height of his paroxyſm, and had three buckets of water thrown over him, after which he was wiped dry, and put to bed again. This effuſion of water had an excellent effect; it relieved his head, and abated the fever. An unfortunate accident happened to him in the evening, which was occaſioned by a boy running againſt the cot, and bruiſing his foot againſt the frame; the adheſion which had taken place was tore aſunder, and he loſt near a pint of blood. His pulſe became feeble, and his extremities cold. I gave him ſome wine, which did not remain five minutes on his ſtomach. The dreſſings were removed, and after cleanſing his foot of the clotted blood, and finding the hemorrhage had ceaſed, I applied freſh dreſſings, with ſuitable compreſſes, and brought the edges of the wound into cloſe contact, with the bandage paſſed round moderately tight. 1ſt May. I found him reduced to a moſt wretched and miſerable ſtate of debility: he refuſed all kinds of nouriſhment; and at night he became comatous, and ſpoke incoherently. Three days elapſed without much alteration, in the courſe of which time he took little food, and only had the decoct. cort. three times a-day, with ſome port wine. May 4th. His ſenſes returned, and the pyrexia left him: his ſtomach, which had been ſo much enervated, began to recover its tone; he took his medicine freely, reliſhed his wine, and expreſſed a wiſh (after mentioning ſeveral articles of food to him, and aſking him if he could fancy any of them,) for ſome roaſted fowl, which I indulged him with. The wound looked well; and I had the felicity of ſeeing my patient (whoſe diſſolution appeared to be approaching, and which fatal cataſtrophe I at one time hourly expected,) in a ſtate of convaleſcence. He now took ℈ij, of the cort. quater de die: and on the 2d June, by the help of nouriſhing food, which he was ſupplied with from Capt. Larcom's and our table, his health and ſtrength were again eſtabliſhed.

"I cannot help obſerving, that ſince I have had the honor of ſerving in the royal navy, many caſes have come under my care, that muſt inevitably have terminated fatally, and ſuch as would have held all the medicine in the Materia Medica at defiance, had not that generous liberality and humanity which expand the heart of every good officer, induced them to ſupply the ſick from their own tables, and at their own expence, dainties that could not otherwiſe have been procured. I am, Sir, with the moſt profound reſpect, your moſt obedient ſervant,

"RALPH CUMING,

"Surgeon of his Majeſty's ſhip Hind."

"TO THO. TROTTER, Eſq. M. D. &c."

MEDICINA NAUTICA.

The following CIRCULAR LETTER *was tranſmitted to moſt of the Surgeons within my reach; and as it affords a general view of the nature of our inquiries, I ſhall give it a place here for the information of thoſe who have not ſeen the original.*

“ SIR,

“ HAVING been for ſome time employed in arranging materials for a ſecond volume of my MEDICINA NAUTICA, I ſhall conſider myſelf much favored by any communications which your experience of the ſubject has enabled you to collect.

“ Although an undertaking of this kind is, in many reſpects, new, it will not be doubted that it may be productive of conſiderable benefit to the public ſervice. More than four hundred ſurgeons are at this moment engaged in medical practice, in different ſtations of the world. Among ſuch varieties of climate, and other circumſtances connected with naval operations, an attentive obſerver cannot fail of meeting with intereſting occurrences. And as a detail of many of theſe may not be of ſufficient extent for a ſeparate publication, it is preſumed that the preſent work will ſerve to bring fugitive and detached remarks into a general view, and thereby record much uſeful matter of fact that muſt otherwiſe periſh.

" Encouraged by the approbation which has been already beſtowed on our former attempts, and ſome valuable communications which have been entruſted to our diſpoſal, we are induced to extend the limits of our compilation, as a repertory for *all information* that can improve nautical medicine, and add to our knowledge of preſerving the health of ſeamen.

" The length of the war has now afforded a wide field for obſervation; and, with the experience of our predeceſſors before us, more correct evidence has been obtained on a variety of ſubjects. It has been particularly intereſting to note the diſeaſes of climate, their variation from ſeaſon and other cauſes; thoſe produced in certain harbours or ſeas of the ſame country; with remarks on the nature of the ſoil near unwholeſome places of anchorage; the water, fruits, &c. whether ſalutary or otherwiſe. Journals of the weather, and other meteorological remarks; hints for improving diet, preſerving proviſions, cloathing, exerciſe, ventilation of ſhips, &c. Theſe, being all connected with the preventive plan, will be carefully regiſtered.

" We ſhall alſo moſt thankfully receive from naval officers, and our medical brethren in the hoſpitals, any information which their obſervations and experience may have ſuggeſted on the abovementioned

mentioned ſubjects. Other members of the profeſſion, though unconnected with the Navy, we gladly hope, will occaſionally offer their ſupport.

"Many ſurgeons who ſerved in the Weſt Indies during the great mortality among the ſeamen and ſoldiers, from the yellow fever, are now in England. We have obtained ſome valuable extracts from different journals; and we truſt that others will favor us with their correſpondence. What we particularly aim at is the knowledge of thoſe neceſſary precautions and means of prevention, that can beſt ſecure the unſeaſoned European ſubject againſt this fatal endemic. From recent experience we have accumulated ſome intereſting facts on Contagion: we ſhall therefore reſume our ſubject, and continue our oppoſition to the *unreſpirable gaſſes*, as correctors. It may be worth mentioning here, that very ſhortly after we had ſtood alone, in denying that any poſitive evidence or unequivocal teſtimony had yet appeared in favour of the nitrous gas, the work of an eminent American phyſician was reprinted in England; in which it is aſſerted this pſeudo-prophylactic is itſelf the very *matter and ſubſtance* of contagion. Whatever faith is to follow the trans-atlantic doctrine, it is a melancholy proof that there is ſtill much conjecture in our art; and which now and then makes it a *ſtumbling-block* to common ſenſe. We accordingly recur to our uſual method of prevention with increaſed confidence.

"A part of this work will be allotted to the practice of Surgery. Some important caſes and remarks have been put into our hands, and we are promiſed others. The fine operation of Mr. Burd, narrated in our former volume, performed on the French officer, while his own ſurgeon was unable and unwilling to aſſiſt him, will remain a *confutation* of thoſe blaſphemous falſehoods which have been ſo induſtriouſly circulated in France againſt Britiſh ſurgeons.

"We earneſtly recommend a careful inveſtigation of the nature and cauſes of that ſpecies of ulcer which has lately been ſo deſtructive in ſhips, and diſtinguiſhed by the rapidity of its progreſs. The only mention of a ſimilar occurrence which we have ſeen in the records of Surgery, is to be met with in Dr. Rollo's late work on "Diabetes."

"I am here induced to mention a book on Cookery, which has lately fallen into my hands, written by Mrs. Melroe, and intitled "Œconomical Cookery." It contains a variety of pleaſant diſhes, that will be found acceptable to both the officers and ſeamen at ſea: and the humane ſurgeon will find among them many uſeful hints for improving the diet of his ſick-berth.

"At a criſis like that in which we are engaged, it will not be diſputed, that on a continuance of the preſent health of our ſhips muſt, in a great meaſure, depend the ſalvation of this country. Among medical officers, therefore, a reciprocal diffuſion of profeſſional information muſt always be uſeful; for it becomes our duty to provide for the moſt deſperate exigencies of ſervice, even in the ſeaſon of unexampled proſperity. But there are many incitements that make this rather an agreeable than a difficult taſk. We have all witneſſed with ſatisfaction the attention which has been paid to render the ſituation of medical gentlemen more comfortable while employed, and to provide for their future ſupport, beyond the example of former times. This will naturally beget a grateful return on our part; while a faithful diſcharge of office, and an aſſiduous attachment to ſcientific purſuits, will entitle us to progreſſive encouragement. This deportment will alſo inſure to us the laſting confidence and affection of thoſe who are the immediate inſpectors of our duty; for ſurely nothing can be ſo acceptable to officers and a ſhip's company, on perilous ſervice, in an unwholeſome climate, or in the dangers of battle, as the attendance of a ſurgeon, who devotes a regular portion of his time to ſtudy, that he may avail his patients of every new diſcovery in the practice of the healing art.

"We preſume not to think, that the preſent is the moſt eligible ſeaſon to render our work perfect: but we ſhall return to it with avidity, when peace and retirement afford us leiſure for reviſal. In the mean time, in order to tranſmit it uſeful to our ſucceſſors, what we want in ability we will endeavour to compenſate by our love of the ſubject, and by diligence and fidelity in collecting and compiling the materials.

" My central ſituation at Portſmouth will facilitate the conveyance of communications; and all letters, *poſt paid*, directed to me, will be duly attended to. The habits of friendſhip and intimacy in which I have long lived with a number of the Surgeons on the Navy Liſt; the uninterrupted intercourſe of theſe, and the harmony of opinion which has united our efforts in public ſervice, on ſome arduous occaſions, will be ſufficient pledges to me that the preſent addreſs will not be diſregarded.—I am, with great reſpect, Sir, your moſt obedient humble ſervant,

" T. TROTTER, M. D.
" Phyſician of the Fleet.

" P. S. It is requeſted that correſpondents will mark their letters, &c. on the cover, "*Medical Communications.*"

To the Surgeon
of his Majeſty's ſhip

ERRATA IN OUR FORMER VOLUME.

Page 117. The Cape ſquadron ſailed in ſo great a hurry, that no time was given to receive the fruit on board. The conſequence was, that the ſhips were overrun with ſcurvy; and had the ſettlement not capitulated when it did, it is hard to ſay whether half the crews of the ſhips would not have periſhed.

ANSWER TO CORRESPONDENTS.

We beg leave to refer "*A young Officer*," to Captain Burrowes, and Mr. Leggat, ſurgeon of Le Puiſſant, for the information he wiſhes concerning the Coloſſus. *Vide* page 165 of our firſt volume.

"Philo Med. Naut." is informed, that the Officer alluded to at the head of page 53, is Sir Edward Pellew, Bart. The "orders" were put into our hands by Capt. A. Morris, who had been firſt lieutenant with that great officer.

We thank "Palinurus" for his kind remembrance every Saturday night. We have profited by his hint; and in return heartily wiſh he may never meet the fate of his name-ſake.

> O nimium cœlo et pelago confiſe ſereno,
> Nudus in ignota, Palinure, jacebis arena!

If the Officer who ſigns himſelf "L. L." whom we take to be Captain of a ſhip of the line, will undertake the taſk himſelf, we ſhould be very proud to inſert it in our pages. If we are to judge of his abilities from the ſpecimen he has given, we could not wiſh to ſee it in other hands.

The communications dated " off Madeira," though valuable, cannot be admitted, there being no ſignature, and the ſhip's name is left out.

The Officer who firſt ſerved cocoa to his ſhip's company, in lieu of oatmeal, in the Weſt Indies, was the brave veteran Captain James Ferguſſon, late lieutenant-governor of Greenwich Hoſpital.

Much important matter, juſt tranſmitted to us, has been withheld for the preſent, from our deſire of giving a ſummary of the American doctrine of contagion and marſh miaſma.

In the department of ſurgery we wiſh to direct our friends to the ſubject of extracting ſplinters in wounds; and burns, from the exploſions of gunpowder in time of action. The firſt belongs excluſively to the navy ſurgeon; as connected with the latter, we would recommend the peruſal of " Kentiſh on Burns."

* * *

APPENDIX.

Remarks on ſome late Proceedings of the Legiſlature of the State of New-York, relative to the Removal of certain Trades and Manufactures from the thickly ſettled Parts of the City of New-York, in an Application of the Mitchillian Doctrine of ſeptic Fluids to the Proceſſes carried on in ſeveral Branches of Handicraft Buſineſs, particularly the MAKING OF SOAP AND CANDLES; *being the Subſtance of the Argument employed at Albany in March* 1797, *to procure the Repeal of Part of a preceding Law (of the* 10*th of February* 1797).

LIKE a calm obſerver, their counſel * ſaid, he had beheld, on ſeveral occaſions, the legiſlature engaged on ſubjects of a chemical nature. The moſt important of all theſe, the prevention of infectious and contagious diſtempers, had again and again been agitated by the repreſentatives of the people. Regulation had ſucceeded to regulation, and project given way to project in ſuch rapid ſucceſſion, that he hoped before this time, by the joint efforts of thoſe who were engaged in the reforms, a ſyſtem of rules, well digeſted and complete in their more material parts, would have been elaborated. He was afraid, however, that a great deal was yet neceſſary to be done. He was alſo apprehenſive there had been ſome things done, which it had been better to have left undone.

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* Dr. Mitchill.

DR. MITCHILL'S NOMENCLATURE.

Septon †, for azote or nitrogene.
Septous gas, for azotic gas, or atmoſpherical mephitis.
Gaſeous oxyd of ſepton, for dephlogiſticated nitrous air.
Septic gas, for nitrous gas.
Septous acid, for nitrous acid.
Septic acid, for nitric acid.
Septate, ſeptite, for nitrate, nitrite, &c.

† *σηπω, putrifacio,* whence comes ſepton, putridum.

He alluded to the act paſſed during the preſent ſeſſion, entitled, "An act to amend an act, entitled, "An act to prevent the introduction and ſpreading of infectious diſtempers within this ſtate," which, as the memorials, remonſtrances, and petitions preſented to the legiſlature ſufficiently expreſs, is conſidered in ſome of its parts as bearing extremely and unneceſſarily hard upon a valuable and induſtrious body of citizens.

The petitioners for relief from the oppreſſion of that law, as well as himſelf, were inhabitants of the city of New-York. He truſted they were all guided and governed by the ſame deſire of rendering their place of abode comfortable and wholeſome. The reſpirable quality of the atmoſphere they lived in was a matter of eminent concern to them all.

From vitiated air, had it of old been believed, that epidemic diſtempers derived their origin; though in the times of rudeneſs and ſuperſtition, it had been conſidered as a mark of piety to refer all viſitations and calamities of this ſort to the anger of the gods, or at leaſt to the diſpleaſure of Heaven. This ſhort way of philoſophiſing was in no wiſe calculated to ſatisfy the curioſity of an enlarged mind. By degrees, however, after a ſeries of obſervations, extended from the 400th year before the Chriſtian æra, quite to the preſent day, it had become eſtabliſhed as a ſettled fact, that thoſe wide-waſting diſeaſes, the plagues of ancient times, by which ſeveral ſea-ports and country places in the United States had, within a few years, been dreadfully afflicted, were moſtly connected *with a peſtilential condition of the air.*

To comprehend how the wholeſomeneſs of the atmoſphere ſhould be deſtroyed, either by a privation of that portion of it which miniſters inceſſantly to the ſupport of life, or by letting looſe vapours and exhalations of a nature noxious enough to poiſon the animals who live and move in it, required an extent of experimental reſearch, which all the accumulated induſtry of the paſt ages had never, until very lately, accompliſhed. It now was admitted on all hands, that though ſomething of an unfriendly compoſition might be formed in the clouds, by the aſſociation of the particles of one kind of air with thoſe of another, yet the principal miſchief aroſe in the form of ſteam from ſubſtances *on or near the ſurface of the earth.*

Since then the exploſion of the aſtrological notion of the malign aſpect and influence of the ſtars, and other bodies above their heads, the eyes of mankind were turned downward in ſearch of the cauſe of the inconvenience they endured, from ſome ſource beneath their feet. After a courſe of various obſervations and experiments, it had been diſcovered, that the greateſt degree of vitiation which the atmoſphere manifeſted by its operation upon the human frame, proceeded not from *earthy or metallic bodies*, but was a ſomewhat emitted *from certain animal and vegetable ſubſtances during putrefaction, and floating about in a volatile form.*

What the nature of theſe *new* aërial fluids was, had remained for a long time utterly unknown. Since, however, the dead body of an animal or plant diſappeared almoſt entirely by expoſure to wind and weather, and left but ſmall traces of its former exiſtence behind, doubts had been entertained concerning the vulgar notion of their return to *earth*, as they ſeemed rather to be reſolved into *air*. The perfect tranſparency of ſuch a fluid, as it reflected no light, put it out of the power of the eye to examine what it was, even when aſſiſted by the moſt perfect glaſſes. Its yielding and impalpable nature evaded examination by feeling and handling, and eluded the niceſt exerciſe of the ſenſe of touch. Thus its want of viſible and tangible properties had rendered an examination of its peculiar nature, for a great while, very imperfect. And even ſince the introduction of veſſels of glaſs into laboratories, it had not been poſſible to inveſtigate thoroughly their hiſtory in any other way *than by attending to their combinations with other bodies by means of chemical attraction.*

In attending to the changes which plants and animals underwent after death, it at an early day had become apparent that the air into which they were converted was not *always* of a hurtful kind; that ſome ſpecies of both claſſes of beings would rot without cauſing any miſchief at all, while other individuals of either ſort, while they underwent corruption, were, though not always, yet frequently noxious, and at beſt, of a ſuſpicious character. Mankind, by attending to the ſubject in all poſſible ways, had diſcovered at laſt, *that ſome putrifying ſubſtances would afford no peſtilential air at all, and others that were capable of yielding it, would only do ſo under certain circumſtances.*

But before the human mind had progreſſed far enough to come to any definite concluſion on the ſubject, camps had been deſolated, armies cut off, and cities depopulated by peſtilence. In contemplating theſe diſtreſſing events, though it was obvious enough the morbid cauſe muſt have originated *locally*, or have been generated on the ſpot, both in the field and garriſon; ſtill, ſo great had been the reluctance of mankind in ſettled and domeſtic life to allow their city or place of reſidence to be unhealthy, that in the hiſtory of all ancient and modern plagues, a belief has almoſt univerſally prevailed of their introduction from ſome *foreign place*. The yellow fever of New York and the other commercial cities of America, for inſtance, if you might give credit to a multitude of teſtimony, had been always imported from ſome diſtant parts, commonly from the Weſt Indies; the inhabitants of thoſe iſlands agreed among themſelves in diſclaiming its origin there, but differed whether it was of Aſiatic deſcent, from the climate of Siam, or of African production in the latitudes of Guinea. Had the Malays or the Negroes the cuſtom of reading our performances, and writing books of their own, they would doubtleſs feel an equal deſire to wipe away theſe aſperſions, and contrive ſtories as plauſible as many of ours, to countenance its introduction by ſome infected traveller from Ethiopia, or ſickly ſailor from the Philippine Iſlands. In like manner, the Athenians of old, though ſurrounded on the land ſide by their Peloponneſian foes, and grievouſly incommoded on a thouſand accounts, as they were cooped up within their citadel and walls, flattered themſelves the plague they ſuffered was imported into their harbour from Egypt. A late ſenſible traveller had obſerved that it never ariſes in Cairo ſpontaneouſly, and affirms it is always introduced from Conſtantinople. The people of this Turkiſh capital comfort themſelves it did not ſpring up originally there, but was brought from the northward by certain foggy or unwholeſome winds that had blown acroſs the moraſſes in the neighbourhood of the Euxine. Theſe prejudices, which had been foſtered and cheriſhed in moſt ſea-port towns, by the ſpirit of commerce, were at this hour happily wearing away. It redounded inexpreſſibly to the honour of Americans to be the firſt to caſt them off. Thoſe peſtilential outcaſts, whom nobody would own, but whom every body ſent as vagrants and vagabonds from country to country, were beginning to obtain an acknowledged and legal ſettlement. They were the monſtrous offſpring of our vices. Deformed and hideous as they were, the parentage and filiation was ours; and as we begat them, we ſhould not refuſe to own them. If the reports which, until a few years, had invariably prevailed, were traced, there could not be found a ſpot or corner of the civilized globe, which gave birth to them. If, on the other hand, attention was given to facts, there was not a city or town in the United States, whether ſea-port or mid-land, nor a houſe or habitation in either, wherein peſtilential diſeaſes might not ariſe. The truth is, *they might and did ariſe in moſt places where corruption and naſtineſs abounded, and of courſe were generally not of foreign derivation, but of domeſtic origin.*

Thus peſtilential vapours might be produced from ſome of the bodies of plants and animals, or ſome parts of them, undergoing diſorganization, on the ſurface of the earth, which being made volatile under certain circumſtances, ſo contaminated the atmoſphere as to cauſe endemic and epidemic diſtempers.

He remarked, that this offspring of putrefaction, though too attenuated to affect the ſight, or the touch, was attracted by other bodies. This was particularly the caſe with reſpect to the *aſhes* afforded by wood burned upon the hearths of dwelling-houſes, and by the *plaiſter* which conſtituted their walls. Long ago had it been known, that the ſcraping of the matters collected near doors, in ditches, yards, outhouſes, and ſtables, as well as the decayed walls and old rubbiſh of dwelling-houſes, were exceedingly uſeful in the fabrication of ſaltpetre. This was ſo well known and underſtood, that under the adminiſtration of the late kingdom of France, the manufacturers of the article were not only incorporated in the city of Paris by their ſovereign, but were allowed to take away from demoliſhed buildings as much of the old mortar as they pleaſed, to encourage the domeſtic production. And notwithſtanding the fuel of that vaſt city was chiefly wood, ſuch had been the accumulation of putrid vapours in the ſaltpetre beds, that the Academy of Sciences, who had directed to examine and report on the ſubject, had recommended the mingling of imported pot-aſh with the crude materials, as a means of procuring ſaltpetre in the moſt expeditious way, and in the moſt abundant quantity *.

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* From Maſſey's Treatiſe.—"The common peaſants in "France and Germany, who are almoſt all ſaltpetre-makers, "ſcrape together the muck and offals of their farm-yards, "and throwing them under open ſheds, ſuffer them to lie "till they find they will anſwer their end. Though they know "little

In theſe alliances then, which *putrid* vapours form with alkaline ſalt and calcarious earth, they had been ſubjected to the moſt rigorous examination, and analized with ſcrutiniſing exactneſs. It had accordingly been proved, by trials made on the effluvia ſteaming directly from corrupting ſubſtances, that they were arreſted by chalk * and ſoda, as well as by the ſubſtances enumerated; and thus he concluded the *obſervations of houſekeepers corroborated the experiments of philoſophers, and both received confirmation from the proceſſes of the ſaltpetre-makers.*

The ſum of the teſtimony from theſe three ſources was, that *pot-aſh* and *lime* ſaturated or neutraliſed the *putrid exhalations* they attracted; that being both of them of alkaline nature, they ſhewed by their analyſis, the material they had drawn from the air was of an *acid quality;* and that this acid,

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" little of the uſe of putrefaction, they take care to promote " this proceſs, by drenching them with urine or muck-water, " and frequently turning them over; by which means they " are brought to maturity much ſooner than the larger " nitre-beds. Theſe materials, with the *wood-aſhes their* " *hearths ſupply,* (if the latter are not added before,) are " thrown into a large tub, and water is poured upon them, " which runs out through a hole ſtuffed with ſtraw at the " bottom of the veſſel. Thus ſimply do they procure their " leys, in the boiling of which their women and children are " chiefly employed. Thus this buſineſs is harmleſs and " healthy, becauſe the pot-aſh keeps down the ſeptic acid, " which would otherwiſe riſe in vapour, and infect the air."

* From Chaptal's Chemiſtry.—" Twenty-five pounds of " chalk, well waſhed in warm water, and expoſed to the " exhalation of bullock's blood in putrefaction during eleven " months, afforded nine ounces of the nitrate (ſeptate) of " lime, in a dried ſtate; and three ounces one groſs of " cryſtals of nitrate (ſeptate) of pot-aſh, or common nitre." Evincing the preciſe and noxious nature of this effluvium.

which, with the ſaline ground, formed common nitre, and, with the earthy baſis, conſtituted calcarious nitre, was *the acid of putrefaction*[*].

As far as the almoſt innumerable maſs of facts on theſe and ſimilar ſubjects had been ſtripped of foreign and adventitious circumſtances, and generalized in a ſcientific and logical manner, there exiſted the moſt cogent evidence, that the production juſt named, and ſome of its modifications, formed the peſtilential poiſon; that under the medical names of *human effluvia* and *marſh miaſmata*, and he ſcarcely knew how many other titles, was commonly called in popular phraſe, *infection* or *contagion*; the operation of which occaſioned ſuch mortality and terror among the people, and which the Legiſlature had with ſuch laudable ſolicitude been engaged in guarding againſt.

He had judged it the more neceſſary to bring forward to notice, the facts tending to ſhew the exact and preciſe nature of peſtilential fumes: becauſe through the whole courſe of his reading and converſation, they appeared to be conſidered as unknown combinations of elementary atoms, equally unknown; myſterious and inexplicable things engendered from the chaos of organic diſſolution;

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[*] From Fourcroi's “ Philoſophy of Chemiſtry.”—“ Nitric
“ acid, liquid, white, cauſtic, of a ſtrong nauſeous ſmell,
“ formed of azote (ſepton) and oxygene, inflaming ſul-
“ phur, charcoal, zinc, tin, and *oils*, *yielding to combuſtible*
“ *bodies*, *various portions of oxygene*, and thus giving birth to ni-
“ trous acid, nitrous gas, or nitrous oxyd, deſtroying colours,
“ burning and turning yellow, vegetable and animal ſub-
“ ſtances, converting them into acids, decompoſing ammoniac,
“ PRODUCED BY PUTREFYING ANIMAL MATTER, forming ni-
“ trats with *earths* and *alkalis*, remaining ſlightly united with
“ metallic oxyds, and tending to acidify them. Nitric
“ (ſeptic) acid, to the production of which it is well known
“ how much *animal ſubſtances* contribute, in artificial nitre-pits,
arifes from the union of oxygene with azote (ſepton).”

productions ſo equivocal, it was hard to know what to call them; ſurpaſſing, as ſome believed, all mortal comprehenſion, and lying far beyond the limits of human underſtanding.

If his attempt to ſtate what it was had been ſucceſsful, then might we be conſidered as having caught nature in her work-ſhop, examined her collection of raw materials, and diſcovered which of them ſhe employed in this fearful manufacture, which, like the *poiſoned ſhirt of Hercules*, enwraps the wearer too cloſely to be ſhaken off. Then both the philoſopher and the ſtateſman would have clews to guide them through the labyrinths of ſcience and legiſlation.

From whatever ſubſtance, therefore, *the acid of putrefaction* was produced, it would be killed in the egg by *lime** and *alkalis*, if they are preſent. They could quell, ſubdue, overpower it. They were the ichneumons which deſtroyed the unhatched and yet harmleſs crocodile. If they were not at hand, the new-born monſter, foſtered and nurtured by heat, acquired the fury of a dragon, ſoon took wing, and flew about the land.

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* From Buillon's "Means of procuring Saltpetre," &c. —"The *nitrous* (he means the *nitric*) acid is generated in the "atmoſphere by the help of the azote, or vitiated air, which "is diſengaged from animal or vegetable ſubſtances, when in "a ſtate of putrefaction. If, therefore, inſtead of throwing "ſand on the ground in ſtables, &c. and building or plaiſtering their walls with fat earth or clay, the ground were to "be covered with marle, or calcareous ſtone, and the walls "within and without plaiſtered with the ſame, beat and "tempered with water, in the form of mortar, in five or ſix "months time the ground and alſo the plaiſter of the walls "would be found ſufficiently changed with ſaltpetre to be "lixiviated with advantage."—"By following the courſe of "Nature, it is poſſible to eſtabliſh artificial nitre-beds: it is "only neceſſary to build walls of calcareous ſtone, and, inſtead of mortar, to make uſe of calcareous marle, tempered "with water: theſe walls ſhould be plaiſtered over with the "ſame kind of mortar, to the thickneſs of about two or "three inches. *If the walls are built in the neighbourhood of "dunghills, or other heaps of filth, they will generate ſaltpetre ſo "quickly, that they may be lixiviated twice a year.*"—The ſubſtances

It might, perhaps, be thought a digreſſion from the ſubject under diſcuſſion, if he dwelt at large upon the trades, occupations, and employments, wherein ſickly exhalations are generated. *Rammazzini* had written well on this ſubject before him. Inſtead, therefore, of going the round of a particular enumeration, he ſhould juſt obſerve that this ſeptic poiſon might be conſidered as experimentally proved to exiſt in city and in country, in the houſes where domeſtic animals, both birds and quadrupeds, were kept, and diſcharged their dung and urine; in privies and the receptacles of human ordure; in grave-yards, and the earth ſurrounding the buried bodies of men; in clothing, bedding, and furniture, impregnated with ſecreted matter and perſpiration; in the corrupted blood and offal of beaſts ſlain for the market; in the ſkinny and lean parts of animals, particularly rotten hides, beef, and fiſh; in putrefied wheat, coffee, cabbages, and certain other vegetable ſubſtances; and in that mixture of theſe and other dangerous materials, which formed the evaporating foulneſs of the New-York ſtreets, and the diſmal collection along the river-ſide.

This *peſtilent acid* is moſt eaſily diſſolved in water. Travelling in company with this guide,

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ſtances he mentions as affording nitrous acid, are "*the filth*
"*of cities*, ſuch as *the contents of neceſſary-houſes*, the *refuſe of*
"*ſlaughter-houſes*, the *ſweepings of the ſtreets*, *dead animals of all*
"*ſorts*, &c."

it gradually ſoaked through the earth on which cities were built, inſinuated itſelf into the receſſes, whither this all-pervading fluid found its way, and took up its abode or gained admittance into ciſterns, wells, and fountains. Even here its alkaline foes attacked and ſeized it. They grappled with it, and held it faſt, until the contending champions could be brought up to day-light, and viewed as they lay clenched in cloſe encounter. After the conflict and effervеſcence which always attended their meeting was over, the two friends for a while were commonly victorious; but exhauſted and overpowered at length, their ſalutary efforts were but of little avail, and poiſon predominated in the reſervoirs *.

To an obſerving mind, the hiſtory of man preſented an abundance of ſimilar truths. He preſumed almoſt every perſon had learned from the newſpapers a deſcription of the dungeon of Olmutz, where the unfortunate La Fayette lingered in captivity. The victim of a vindictive policy, he there received little conſolation from human friendſhip. Still he was not without a friend. The *lime* which cemented the ſtones of his diſmal apartment, attracted the deadly vapours which threatened his life, and formed with them the *nitrous efflorescence*, which crept along the walls.

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* From Bergman's "Analyſis of Waters."—"SNOW-"WATER contains a ſmall quantity of ſalited lime, together "with ſome ſlight veſtiges of *nitrous acid*, &c." "RAIN-"WATER is generally contaminated with the *ſame ſubſtances* "as the former, but in GREATER QUANTITY, &c." "WELL-"WATER, beſides a large quantity of the above-mentioned "ſubſtances, often afford GYPSUM and NITRE." "LAKE-"WATERS are leſs clear than any of the former, &c. they "ſometimes contain all the ſubſtances above recited; and, "beſides, are generally vitiated by an ANIMAL OF VEGETABLE "EXTRACT." "MARSH-WATERS have leſs motion, and "therefore are leſs clear, more heavy, and more VITIATED "*by* EXTRACTIVE MATTER, &c."

The bills of mortality ſhewed that large and crowded cities were unfriendly to the rearing of children to manhood. Was it wonderful? The infant inhaled peſtilence with the air which firſt expanded his little lungs, abſorbed it at every pore, ſwallowed it with the tainted milk of the mother's breaſt. The water which ſlaked his thirſt, and the food that ſupported his ſtrength, were contaminated with the ſame miſchievous ingredient. And this operating in ſo many ways upon his tender frame, brought it to a premature diſſolution, unleſs it ſhould be hardy enough to become ſeaſoned by degrees to the poiſon, and grow inſenſible of its effects. What happened to the child, happened alſo to the parents. The air, the earth, the water; food, clothing, bedding; all became more or leſs tinctured with *ſeptic matter*, produced in a great degree from ſubſtances collected by their own hands, employed with the moſt perverſe of poſſible induſtry, in *forming the tiſſue of this domeſtic manufacture.*

The *Soap-Makers* and *Tallow-Chandlers* of the city of New-York, were conſidered by the bill, which had been paſſed during the preſent ſeſſions, as contributing largely to the maſs of peſtilential vapours. Theſe uſeful citizens conſidered themſelves aggrieved by the judgment the legiſlature had paſſed upon the buſineſs they followed. They felt a confidence the effluvia from their manufactories did not impair the health, far leſs deſtroy the lives of their fellow-citizens. If the occupation did, like THE UPAS-TREE, ſpread around the ſpot where ſoap and candles are made, deſolation and death, they would not only ſubmit to the imputation and its inconveniences without a murmur, but in a public-ſpirited manner, would applaud the juſtice of the ſtatute.

He ſhould examine the ſubject in two ways. Firſt, upon its principles: and ſecondly, upon its actual operation: and he had little doubt it would appear upon diſcuſſion, to be a harmleſs occupation *generally*, and even capable ſometimes of counteracting the effects of contagious and infectious vapours.

From the facts heretofore adduced, he believed there would be little need of ſtating additional evidence to prove that *lime* and *potaſh* were conſtantly engaged in baffling the powers of peſtilence, and fighting the battles of health. Thoſe articles formed a large part of the materials with which the manufacturers alluded to carry on their buſineſs. It would be a moſt remarkable diſcovery, that a law of nature, which acts uniformly in other inſtances, in making theſe exhalations ſubmit to alkaline dominion, ſhould fail to operate, or ſhould ſuſpend its efficacy as to this. But there was no ſuch irregularity known to exiſt. The ſeptic acid fumes which infected the air of the inland country, oftentimes as much as of ſea-ports, and made, in proportion to numbers, as great havoc in interior towns as in any place whatever, yielded to the coercion of *potaſh* around the letch-tubs of Cobus's kill, as well as in the ſoap-works in our capital. Nor was the *lime*, which was always employed to give ſharpneſs to the ley, inactive in other reſpects. So far from remaining idle, it had no ſooner whetted the weapons of its ally, than it prepared to attack, though with feebler powers, the common enemy both of themſelves and of mankind. He might appeal to the knowledge which many of the members of the legiſlature had of the method of managing potaſh works, whether ever a peſtilential diſtemper was generated there? There was no ſuch thing known. The dæmon of peſtilence would be inſtantly arreſted on ſhewing his face there, and ſo cloſely confined and guarded, that he never could eſcape and prowl about for human prey any more. The lixiviation of aſhes then, and the extraction of its alkali, ſeemed to be excuſed on every conſideration, from having any agency in this *deſtructive work both in town and country.*

Here, however, it had been alleged, that the *fat* which conſtitutes the other part of the ſoap, and the whole of ſome ſorts of candles, putrefied and emitted exhalations of a quality ſo deleterious, that a wiſe policy ſhould prohibit the carrying on the proceſſes, for which the oily parts of animals were collected, and by which theſe alarming vapours were ſuppoſed to be extricated. If this charge could be ſupported, then indeed ought the law to be carried forthwith into execution. But he did not know any *facts* which countenanced ſuch an opinion. The true interpretation of them led to an oppoſite concluſion. He then proceeded to examine them.

The diſtillation of animal fat in cloſe veſſels, ſaving the ſebacic acid, gave no volatile ſalt at all; far leſs any fluid poſſeſſing the qualities complained of. Its conſtitution was ſuch, that the peculiar ingredient which became the baſis of noxious airs, and without which the truly peſtilential compoſitions could not be formed, reſided not in it. Hence, though it might become rancid and ſmell diſagreeably, the effluvium was not poiſonous. From the nature of the material, every houſewife knew, that though the *fat* might ſmell as bad as the *lean*, it did not turn to rottenneſs in the ſame manner.

Again, repeated obſervation had aſſured us, that on the eſcape of the noxious ingredient from animal ſubſtances decaying in large heaps, as happened in the public burial ground of the city of Paris a few years ago, the reſiduary portion turned to lumps of *fat*, almoſt as firm as ſpermaceti. This fact was ſo well eſtabliſhed, that economical projects had been formed to decompound the carcaſes of animals under water, in ſuch a manner, that while the peſtilential matter inherent in the blood, ſkin, brawn, and muſcles, gradually eſcaped into the water, the reſidue of the lean parts turned to fat. Need he dwell upon the ſtatement of other facts of this ſort, which the periodical publications of Europe for ſeveral years paſt, have announced to the world ſo often?

Further, it was in the power of art to imitate theſe proceſſes of nature. The operation was as eaſy as almoſt any in chemiſtry, by driving off the ſpecific portion, whence peſtilential air was generated, to convert a bit of the leaneſt beef into fat or tallow. During the continuance of life, the harmleſs atoms, which by their binary union, conſtitute fat, reſtrained the diſorganizing efforts of their partner; but when the partnerſhip among the ingredients of a muſcle was diſſolved by death of the animal to whom it had belonged, peſtilence ſallied forth, free from reſtraint, and diſclaimed his *greaſy* connection. It was to the gentle, but firm operation of this very fat, ſo much complained of, or of the elements from which it might be formed, that the peſtilential matter of our bodies is in a good degree held in bondage during life, and prevented from exerciſing thoſe deſtructive powers upon its own conſtitution, which, on its enlargement, act with deadly malignity upon others. The whole of the phenomena of the compoſition of living muſcles, and the decompoſition of dead ones, held forth this truth, *that neither oily ſubſtances, nor the materials of them, contained peſtilential poiſon, or its eſſential ingredients.*

Beſides, New-York afforded monuments enough of the efficacy of oil, even under the diſadvantageous form of mixture with metallic bodies into paint, to evince its power of arreſting infectious vapours. Look at them (continued he) in their filthy birth-places, the bottoms of the ſlips and docks. See them aim at the timber of the veſſels, that at low-water are grounded there in the mud. Behold the oil quit its union with the white-lead with which it had been mixed, and turn black by deſtroying the acid, which was endeavouring to eat through to the planks. View theſe peſtilential ſteams as they riſe and exert their deſtructive effects upon the neighbouring houſes. Direct your eyes to the blackened ſign-boards, where the oil has ſo long withſtood their aſſaults *, that ſcarcely a letter of the inhabitant's name is legible. Enter the rooms, and ſee the vapours, which the oil has ſo firmly reſiſted, thicken, deſtroy the birds in their cages, and doom their owners to the grave. He added, that theſe facts, which were as public as the market, and obtruded themſelves upon the notice of every paſſenger, would, if fairly interpreted, bear witneſs to the ſolidity of his argument.

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* From Chaptal's Chemiſtry.—" The action of the nitric " (ſeptic) acid on moſt *inflammable* matters conſiſts in nothing " more than a *continual decompoſition* of this acid."—" The " nitric (ſeptic) acid, when mixed with oils, renders them " thick and *black*, converts them into charcoal, or inflames " them, according as the acid is more or leſs concentrated, " or in greater or leſs quantity."—" The facility with which " this acid is decompoſed renders it one of the *moſt active*, " becauſe the action of acids upon moſt bodies is in conſe- " ſequence of their own proper decompoſition." THUS OILY SUBSTANCES DECOMPOUND THE MATTER OF INFECTION.

Once more: it was well known that ſeveral acids, and particularly the *acid of putrefaction*, was decompoſed very readily by *fat* and *greaſy* bodies, and that ſo rapidly, as, with many ſorts of oils, to burſt into flame. This capacity of acids to combine with animal fats was ſo well underſtood, that *acid ſoaps* had been manufactured. But the experience of mankind had long ago ſhewn, that they were unfit for rendering ſubſtances clean. They had accordingly been diſcarded from the arts, through practical conviction, not theoretical opinion. Could a ſoap, he aſked, compounded of fat and a peſtilential acid, neutralize and remove infection from tainted clothes? What but an alkali could drag it from its retreat, entangled as it was with the woof, and intertwiſted as it were with the filiaments of the cloth? It was the ultimate and irrefragable proof of a principle, when inferences and deductions from it coincided with common ſenſe and the experience of ages. The true reaſon why alkalis are preferred as the baſes of ſoaps was, that they deterged the excreted matters which ſtick to our garments, whoſe acidity, when accumulated and concentrated by extreme frowzineſs and long lying or wearing, firſt *reduced the fabric to rottenneſs and rags, and then turned to peſtilence.* He thought the hiſtory of priſons afforded ample confirmation of this concluſion.

Theſe conſiderations led to the conviction that *oils* and *fats* were *not* capable, from their compoſition and nature, to afford peſtilential air; that they either neutralized or decompounded acids, and *thereby weakened or deadened the power of contagion.*

Lime, *potaſh*, and *fat*, thus were antidotes to contagion, in *their diſtinct and ſeparate forms*. The cleanlineſs and health attendant on the *combination of them into ſoap* was ſo evident to every body, that there was no need of offering a word on that part of the ſubject. Though he could not paſs it over, without remarking, that it was a very curious and ſingular event in the annals of legiſlation, that a manufacture, whoſe ingredients, whether conſidered ſeparately or in compoſition, were labouring with an effect, which almoſt exceeded calculation, to diminiſh the cauſes, and frequency and violence of epidemic fevers, ſhould, in the preſent ſtate of ſcience, and near the cloſe of the eighteenth century, and in an American republic too, be treated by a legiſlature *as an internal hot-bed of infection!*

He proceeded, in the ſecond place, to inquire whether the reaſoning he had uſed was bottomed on experience? In order to determine this, he exhibited a few examples to ſhew that men might deal in oil and fat in all their forms, both vegetable and animal, externally and internally, without being ſubject to plague, yellow-fever, or any diſtemper that reſembles them.

He ſaid, the *whale-fiſhery* afforded inſtructive evidence to this point. That induſtrious and enterpriſing body of people who ſent from Nantucket veſſels and ſeamen to make war on the inhabitants of the ocean, knew that the effluvium of animal oil was not pernicious. They found their huge prey in all latitudes between the region where Diſko borders upon the arctic circle, and that where, in the oppoſite hemiſphere, Georgia, the extreme of habitable land, ſtretches toward the ſouth pole; and in all longitudes betwixt the tract of Eaſtern Ocean which ſeparates Madagaſcar from the African coaſt, weſtward to the parallel where

Juan Fernandez riſes above the waves of the Pacific. Through this extenſive range the whalemen took on board their blubber, and either ſubjected it during the voyage to the operation of fire, whereby it might be ſeparated from the ſkin and membranes, or brought it home barrelled up in large junks, to be tried or melted in their houſes on ſhore. Such a veſſel was filled with the exhalations of oil, putrefying in the caſks and ſmoking from the boilers. The men, their clothing, the oars of their boats, yea the deck they tread upon, ſeemed to be penetrated through and through with them. Yet, ſtrange as it might appear, theſe voyages were among the moſt healthy which are performed. It was a rare thing to loſe a man during a run of eighteen months or two years, by ſickneſs. However common diſtempers might be in the navy, in the tranſport, and in the merchant-ſervice, there was no inſtance known of a putrid or malignant fever cauſed by ſtinking oil or its vapours, ſweeping off the crew of a whaleman.

He obſerved that *the cuſtoms of the Caffrarians*, naſty and diſguſting as they were, afforded, among many other inſtructive particulars, an example of the harmleſſneſs of *fat* and *oil*. The rank and horrible greaſe with which they beſmeared their bodies, never excited fevers nor peſtilential diſtempers. On conſidering the poiſonous atmoſphere of Java, which the young civilized Hottentot, mentioned by Rouſſeau, had been accuſtomed to breathe, our wonder at his determination to rejoin his countrymen at the Cape of Good Hope ought almoſt to turn to a ſentiment of approbation, when we reflect, that as he had long lived with his naked ſkin expoſed to the corroding vapours of Batavia, he longed to be once more a member of a ſociety, whoſe cuſtoms would permit him *to ſhield himſelf from peſtilence by unction with greaſe.*

The Jewiſh rites, which were detailed with ſo much minuteneſs in the book of Leviticus, were quoted as perfectly conformable to the principle under conſideration. Their *ſin-offering of ignorance* was made by taking "all the fat of a bullock, the fat that covereth the inwards, and "all the fat that is upon the inwards, and the two "kidneys, and the fat that is upon them, which "is by the flanks and the cawl above the liver;" this was ordered to be burned by the prieſt upon the altar, and might be done amidſt the people: "but the ſkin of the bullock and all his fleſh, with "his head, and with his legs, and his inwards, and "his dung, even *the whole bullock* ſhall he carry "forth WITHOUT THE CAMP, into a clean place, "WHERE THE ASHES ARE POURED OUT; and "burn him on the wood with fire; WHERE THE "ASHES ARE POURED OUT, there ſhall he be "burnt." Such were the regulations of MOSES for atonement of the *ſin of ignorance* in *prieſts;* and with variations of *young* bullocks, *kids of the goats*, and *lambs*, was conducted in much the ſame manner for the ſame ſin in the *congregation*, the *rulers*, and the *people.* He knew not of any mention of peſtilential diſeaſes cauſed by the effluvia of *burning fat*, in any of theſe and other numerous ſacrifices of this peculiar people, though it was probable the inconveniences ariſing from the conſumption of the other parts at or near the altar might have brought the Jews to the *practice of carrying them among the aſhes without the camp.* Had the fumes from the fat been of a deſtructive nature, the prieſts muſt have ſoon expired beſide the victims. It was not probable that under a theocracy, where the miniſters of religion were held in ſuch high reverence, a duty would have been aſſigned them, the performance of which was unavoidably attended with the inhalation of noxious and deadly air. So far from it was the practice reckoned, that it was called "a ſweet ſavour." He believed it would be ſound policy to let the manufacturers of ſoap and candles remain where they are; and while they were happy in offering *peace-offerings* and treſpaſs-offerings with their fat, and labouring to purify and illuminate the city, the RULERS might order what proceſſes upon the *other* parts of animals the PEOPLE ſhould carry on WITHOUT THE CAMP.

The fumes of animal oils were thus (he continued) harmleſs in their operation, while they were putrefying, boiling in kettles, and burning in the open fire; and ſo were the *fats* themſelves, when in either their mild or rancid ſtate, they were daubed upon the human ſkin.

Nor were their effects leſs remarkable when conſidered as articles of diet. There was an ancient ſtory, that the gift of the olive was judged more beneficial to mankind, than that of the horſe. The oily product of this vegetable and of ſeveral others entered very largely into the food of the ſouthern nations. The Eſquimaux of the North regaled himſelf, when hungry, with a draught of the oil of a ſea-dog or a whale, and this without detriment, even when it was in a moſt rank and offenſive ſtate. Theſe examples might ſuffice to give an idea of the operation of fatty and oily ſubſtances upon the ſtomach and bowels. He muſt omit the regular dietetic conſideration of them, as ſuch a diſcuſſion would lead him too far from his purpoſe.

Yet it had been urged, after all this, that if theſe manufactures were not peſtilential, they were intolerable *nuiſances*; that they generated *impure* air, and ought to be turned out of town.

It was true, he allowed, that in the ſenſe of the word *nuiſance*, as a term at common law, theſe manufactures might be ſo badly conducted as to degenerate to *nuiſances*. This had been frequently the caſe in England, and indictments had been brought and proved againſt them. But the application of this term, and the meaning commonly annexed to it, ſhowed that there muſt be ſomething capable of being *ſeen* or *ſmelled*, or *both*, in the air, according to common acceptation, to proceed upon in a complaint of nuiſance. If the *eyes* and the *noſe* were not offended by *ſmoke* and *ſtench*, then it was generally believed that things go on well enough. He believed there were few or no inſtances of indictments found, where the tranſparency of the air was complete, and where the noſtrils were not ſaluted by bad odours. Yet ſo the thing was; and it was of great importance to be underſtood, *that an effluvium of a moſt fetid nature might exiſt, without a particle of infection*: and, on the other hand, as the hiſtory of moſt epidemics evinced, *an exceedingly virulent and deſtructive condition of the atmoſphere did exiſt, with ſcarcely any ſenſible qualities at all.* The former were the *nuiſances* which had uſually been contemplated in common law: the latter, in which the intereſts of ſociety were infinitely more concerned, had been paſſed over as of no moment whatever. He wiſhed this matter was underſtood by grand juries. It would be their duty to preſent a *peſtilential ſtate of the air, however free from opacity and odour*, as the greateſt of *nuiſances*, and find bills againſt all places and things which produced it. This probably would never happen until they ſhould be convinced that though a peſtilence might be accompanied *accidentally* with *haze* or *ſtench*, yet its moſt formidable effects were felt when neither the *ſight* nor the *ſmell* gave any evidence of its preſence. It went about unſeen, and approached like a thief in the night. It was, however, within the juriſdiction of our Courts, and ought to be treated with the rigor of ſtern juſtice. Then ſhould we not be "afraid "for the peſtilence that walketh in darkneſs, nor "for the deſtruction that awaiteth at noon-day."

If ſtill, while the great ſources of miſchief and miſery were left unregarded, a few manufacturers and tradeſmen muſt be ſelected from the reſt, and offered up as a ſacrifice to ſuch undiſcriminating policy, why proſcribe them by ſtatute? If their occupations are nuiſances, they muſt be either of a *public* or of a *private* nature. On proof of their being public *nuiſances*, the common law provides that the ſheriff may enter with his poſſe comitatus, and abate them. If an individual offend by erecting or continuing a *private nuiſance*, the aggrieved neighbour has his remedy in a civil action for the recovery of damages. By this innovation, the trial of fact, nuiſance or no nuiſance, by a jury of the vicinage, was taken away, and a new tribunal inſtituted to decide upon the rights, properties, and privileges of freemen. The citizens aſked if this were done in the ſpirit of deliberate and careful legiſlation? They were importunate to know what deep reſearches their repreſentatives had made in theſe inquiries beyond the magiſtrates of the cities of Europe and the philoſophers of both hemiſpheres?

All this, it would be ſaid, was true in theory, but not capable of being reduced to practice. On complaints made, grand juries were ſlow in finding bills, and traverſe juries reluctant to bring in a verdict to their neighbour's detriment; that, however

ever true the doctrine was in the abſtract, there was vaſt difficulty, often an impoſſibility, of carrying the principle into effect. Therefore there grew a neceſſity to adopt ſome other mode of managing theſe matters. In ſhort, jurors, it was alleged, would not do their duty, and ſome other perſons muſt be got who would. Suppoſe jurors as delinquent as they are ſtated to be, and that *Commiſmiſſioners of Nuiſances* have in ſome inſtances their uſe, there was no need of them in the preſent caſe. It had been proved already, and there were certificates and opinions enough beſides, if there was any need of them, to ſatisfy every mind, that the manufacture of ſoap and candles might be carried on in the city without endangering the health of the people. And as to the offenſive and ſuſpicious part of their buſineſs, theſe tradeſmen would voluntarily, without murmuring, and without public expence, render their *crude tallow and butcher's fat*, in ſome remote place, where nobody would be annoyed by the vapours they emit.

He was aware it had been alleged, the vapours theſe ſubſtances emit rendered the air *impure*; and proceſſes affording *impure* air ought to be prohibited, leſt the health of the citizens be injured by it. The meaning of this word, (one of the words of the act,) he ſaid, was ſo vague and general, that it was hard to find out its particular application. It might ſignify air loaded with *ſmoke* or *duſt*, or any thing which ſpoils its clearneſs, and mingles with it foreign matter. Theſe, indeed, rendered the atmoſphere *ſooty* and *dirty*. It might be interpreted to expreſs the exhauſtion of the reſpirable part of the atmoſpherical maſs, *the empyreal or pure air*, and conſequently leaving the reſidue deprived of its vital portion; and in this ſenſe of the word, the burning of all fuel, the calcining of metals, the formation of vinegar and all acids, were proceſſes exceedingly productive of *impure air*: or it might intend that *odorous* bodies made air *impure* by diffuſion of their particles abroad, and then camphor and tallow, ambergris and rotten eggs, the roſe and the tan-vat, the tar-pot and the ſolutions of ſulphur and phoſphorus, all contributed to the *impurity* of the air. Or it might mean, laſtly, that ſomething of a deſtructive nature, not to be ſmelled or ſeen, was diffuſed through the air, and rendered it *impure*; then the formation of *fixed air*, *ammoniacal air*, *inflammable air*, *phlogiſticated air*, *dephlogiſticated nitrous air*, and *ſeptic acid air*, and of every other ſort of air, except empyreal air, was a proceſs, whereby *impure*, that is, *non-reſpirable air*, is evolved. Each of theſe aërial productions was conſtantly mingled, in a greater or leſs quantity, with the common atmoſphere, eſpecially that of cities; and every one of them, in its pure and unmixed ſtate, was either directly noxious, or at beſt poſſeſſed no life-exciting power.

The truth was, that *vital air* in its *pure form*, was found by ſufficient experiments to be too keen and ſtimulant for the purpoſes of health and longevity. To guard againſt this exhauſting effect of an atmoſphere *too pure*, the Author of Nature had tempered it ſo, that to about one fourth of air of a vivifying quality, there were added three fourths of an air poſſeſſing no properties of a kind adapted to regenerate the pulmonic blood, and keep the heart in motion. *Three fourths* of the air we are obliged always to breathe was *impure* already, and mankind lived the longer for it. Leſs than *one fourth* of vital air would anſwer the purpoſes of life very well. When the *purity* of air was talked of then, if it meant mere and undiluted vital air, it meant a condition of things inconſiſtent with the natural conſtitution of this world; if it meant the ordinary atmoſpheric mixture, then it meant that ſalubrious ſtate of it, wherein three quarters were already *phlogiſticated* or *foul*.

Thus conſiderably leſs, he concluded, than a quarter part of *pure* air in the atmoſphere would anſwer the wants of animals. There were only certain proceſſes in nature and the arts, and they were very well underſtood, which deſtroyed the reſpirability of the atmoſphere. There were a thouſand things of the volatile and odorous kind, which, though diffuſed through the air, and thickly too, ſeemed not to leſſen its reſpirability in the leaſt, or in any meaſurable degree, nor to poſſeſs any thing hurtful. There were other things of a volatile, though not odorous nature, that might do vaſt miſchief by inducing fevers, without rendering the atmoſphere unfit for breathing; and ſome that might at once poſſeſs qualities directly deleterious to man, and deſtructive to vital air. The *ſeptic acid exhalations*, riſing from certain putrefying bodies, were of this latter kind. Though their peſtilent qualities were ſo diſmally known by their effects, yet as their tranſparency, tenuity, and want of obviouſly ſenſible properties, rendered it difficult to catch and analyze them, ſo they have ſcarcely ever been taken into the account, in eſtimating the *impurity of air* *. To make language [illegible] preciſe,

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* Nitrous gas and *ſmoking nitrous acid* are both of them, in the forms in which we ſee and handle them, artificial productions. They can preſerve their form and conſtitution in cloſe veſſels only. So great is their attraction for the principle of acidity, that they decompound vital air with great rapidity, whenever they meet with it, attracting to themſelves its oxygen, and ſetting looſe its caloric or matter of heat. From the greedineſs with which they abſorb the

baſe

preciſe, that conſtitution of the atmoſphere which brings on plagues and other diſtempers of a ſimilar nature,

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baſe of pure air, they very ſoon become highly oxygenated, and turn to *ſeptic acid* or *ſeptic acid vapour*, pale, colourleſs, and in its ſparſe or dilute form, affecting the ſmell in a very ſmall degree, or not at all. Availing themſelves of this tendency of *nitrous gas, to become ſeptic acid on its union with oxygen*, the Chemiſts have invented the *Eudiometer*, an inſtrument calculated to meaſure what proportion of vital air is deſtroyed by a given quantity of nitrous gas mixed with it. *The proceſs going on in the eudiometer is the very one by which infected air is formed*; and nothing but an additional quantity of it is wanting to contaminate the air of the experimentor's chamber, and make him ſick or kill him. If now the *matter of peſtilence*, or *volatile ſeptic acid*, already exiſt in the atmoſphere, and conſtitute a portion of the air taken into the eudiometer for trial, in ſickly ſeaſons, it is impoſſible that nitrous gas ſhould enable us to detect it there. Peſtilential air is nitrous gas ſaturated with oxygen, and volatalized by heat; that is to ſay, the ſame ſort of fluid which is produced in the eudiometrical experiment; and as nitrous gas only meaſures the quantity of oxygen air decompounded, peſtilential air will remain untouched and unchanged by it, ſeeming to lie quite beyond its reach. Hence we may underſtand why, upon principle, the eudiometer ſhould be incapable of aſcertaining a peſtilential condition of the atmoſphere, or giving any notices about it; and wherefore in practice experiments with that inſtrument have never advanced our knowledge or enlarged our ideas on this point. The difficulty which has attended the inquiry into the true hiſtory of the fluids which have azote (ſepton) for their baſis, ſeems to have ariſen thus: A parcel of ſaltpetre was taken and decompounded by a ſtronger acid in a cloſe veſſel: an acid called thence the *nitrous*, came over into the receiver, and ſeparated itſelf into two portions, a quantity of oxygene gas, which was ſuffered to eſcape, and a portion of ſmoking acid, which was condenſed and ſtopped up for uſe. Its production thus was *artificial*, and it was always kept bottled up in a forced and unnatural manner. All this time, ſo ſtrong was its attraction for oxygen, that the greateſt care was neceſſary to prevent, by the cloſeſt ſtoppers, any communication between them. From this fuming acid the nitrous gas for experiments was uſually obtained; a production more artificial than nature, ought to be deſignated by the term “peſtilential,” rather than “impure.”

He did not pretend to doubt that the legiſlature might wholly forbid and prohibit particular manufactures. Conſequently they might limit, modify, and direct the method of carrying them on. The power of regulating trades and mechanic arts, among other things, unqueſtionably reſided with theſe repreſentatives of the ſovereignty of the people; but, he believed, it was equally clear, that though the legiſlature poſſeſſed this power, they were under a high and ſolemn obligation to employ *diſcretion* in the uſe of it. It was a great misfortune when legiſlatures meddled with what they

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than the former, and incapable of exiſting ſo long a time in the open air. Now it is remarkable, that the attention of philoſophers has in a great degree been directed to theſe *artificial productions*, while the *natural compounds of ſepton and oxygene* have received but a moderate ſhare of attention.

Theſe natural compounds are *ſeptic oxyd* and *ſeptic acid*; the former of which *always*, and the latter *very often*, exiſts in an aërial or volatile form. Theſe are capable of maintaining their condition unaltered, under all modifications of the atmoſphere. Their production, their abundance, their activity, their relations to other bodies, their decompoſition, occupy an ample ſpace in the field of philoſophy; the ſurveying and cultivating of which will afford employment for a great number of hands. Their attractions and affinities ought to be watched with the utmoſt care; and although the eudiometer may not be adapted to direct our views in theſe reſpects, there are many other aids of which the diligent obſerver may avail himſelf. The exploring of this region, by following the footſteps of Nature, muſt be allowed to be the moſt ſafe and ſure. Very many who have engaged in the undertaking have been careleſs, and gone ſo far aſtray, that their performances contain but a ſmall amount of valuable information. If they will leave alone *their ſmoking nitrous acid* and *nitrous gas*, and attend to the hiſtory of the *ſeptic oxyd* and *acid*, they will proceed in natural order and method, and make vaſtly greater progreſs.

had better let alone. It leſſened reſpect for the laws, and diſpoſed the citizens to neglect or break them. The ſpirit of a free government made a voluminous ſtatute-book neceſſary. A complicated maſs of laws was one of the conſequences of complete civil liberty. Where little or nothing was left to the *will* of individuals, *legal* proviſions muſt be very minute, and extend to the detail of things. On no pretence whatever then, ſhould the code be ſwelled needleſsly, or laws enacted upon wrong principles.

There was proof before the legiſlature of the labourers at manufactories of ſoap and candles, having a remarkable exemption from the plague of Philadelphia in 1793. The ſame ſort of evidence was afforded by three ſeveral manufactories of ſimilar articles within the limits of the plagues of New-York, in 1795 and 1796. It had been remarked with ſurprize, and talked of as an unaccountable thing in Great Britain and Ireland, that during the rage of epidemic fevers, the people who followed theſe branches of buſineſs generally eſcaped, and oftentimes many of their neighbours alſo. Accordingly the police of the beſt-regulated cities of Europe, had not treated theſe manufacturers as ſtirrers up of peſtilence in their municipal regulations. He thought it might be collected from the relations of travellers, that the peſtilential diſtempers in ſome parts of the Turkiſh dominions were connected with a ſcanty ſupply or total want of ſoap. The detection of the compoſition and nature of peſtilential vapours had explained theſe facts, and furniſhed a principle which cleared up the doubt and myſtery of the whole ſubject *.

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* The eye of an obſerver frequently meets with facts which illuſtrate and confirm this principle. In Mr. Gaine's almanac

He called upon thoſe whom it concerned, to ſee now what had been done. Notwithſtanding all this teſtimony, the legiſlature had pronounced againſt theſe artiſts, and forbidden their manufactures to be carried on, but beyond certain limits, becauſe they were *nuiſances*, and generated *impure* air. This ſavoured a little of legiſlating upon words; while the great body of facts, and the principle which pervaded the whole evidence, and the true interpretation of the phenomena, ſeemed to be overlooked. A public regulation, which was wrong in principle, could not be expected to command univerſal reſpect. It was an unhappy occurrence when the people complained of the laws; but it was likewiſe unhappy that they ſhould ever have reaſon to complain.

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almanac for 1797, (a compilation containing much prudential and economical matter,) there is a GOOD FAMILY RECEIPT, by which any meat, ever ſo ſtinking, may be made as ſweet and wholeſome in a few minutes, as any meat at all. The receipt is as follows: "Take ſome white ley, that "is, boil ſome clean aſhes in water; let it ſtand till it ſet-"tles; pour this off as clear as rock-water; boil your meat "in this three or four minutes, or till it is ſweet, then waſh "it and dreſs it in any way, and no perſon could diſcover it "had ever been fetid, or ſtinking. This will be found a "uſeful communication to the army and navy, where a "*ſolution of potaſh* may be uſed, inſtead of the white ley." I have learned, that ſome of the huckſters in the city of New-York, make a practice of buying up ſtinking beef, and tainted meat of all ſorts, at the public ſales, (our buyers and ſellers do not conſider this ſale of damaged proviſions as injurious to the public health,) for a very low price, and of ſweetening them by waſhing and ſoaking *in ſoap-boiler's ley*. They find that a few pails-full of ley will reſtore to eatable condition a barrel of ſtinking meat, which, by *this operation of the potaſh*, is reſtored to a ſound ſtate, and ſells for as good a retail price as if it had never been corrupted at all. Can there be any thing more deciſive as to the effect of *this alkaline ſalt*, in damping the peſtilential fumes already riſen, and preventing the extrication of more?

EXTRACTS

FROM A

DISSERTATION ON THE MEDICAL AND CHEMICAL HISTORY OF SEPTON, AZOTE, OR NITROGENE;

AND

ITS COMBINATIONS WITH THE MATTER OF HEAT AND THE PRINCIPLE OF ACIDITY.

BY

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The Difference between the gaſeous Oxyd of Septon, and Atmoſpheric Air.

THEY both conſiſt of like ingredients, but vary in their proportions and combinations. The atmoſphere is compoſed of 73 parts of ſeptous gas, and 27 of oxygenous; but theſe are mixed together *mechanically*, juſt as wheat and rye are diſtributed in a heap of grain, or as ſand and ſhells lie diſperſed along the ſea-ſhore. The particles of each are fully mingled with thoſe of the other; but during all this intercourſe, both ſepton and oxygene retain their attraction for caloric in full force; and while this continues to be the caſe, no union takes place between the *putrifying* and *acidifying* principle, as, in common circumſtances, both poſſeſs a ſtronger attraction for the matter of heat than for each other. The proportions of theſe ingredients, in our atmoſphere, are not, however, invariable; for ſometimes the one, and ſometimes the other predominates, according as the one is abſorbed or fixed, and the other effuſed, or ſet looſe in greater quantity in the operations of nature. The proportions ſtated ſeem to be about the mean ratio; and the reaſon of their not more frequently combining and ſpoiling the reſpirability of the atmoſphere is, that when once they aſſume the form of gas, they have leſs affinity to each other than to the fire, which gives them their permanent elaſticity: the requiſite to their chemical union then is, *the abſtraction of their caloric.*

If there is any proceſs in which the principle of acidity and of putrefaction loſe their quota of heat, and enter into combinations with other elements, to form organized or other bodies of complex ſtructure; in that caſe, the main impediment to their union, caloric in exceſs, will be removed, and there will be a poſſibility of their junction. It is admitted, that ſepton and oxygene enter into the compoſition of certain animal and vegetable ſubſtances: but, in the living ſtate of theſe, they are connected with other elements, in triple and quadruple alliances, and continue thus united until their connection is ſevered by the diſorganization of their fabric after death.

There appears thus a ſituation, during the decay of organized bodies, in which naked ſepton and oxygene may come within the ſphere of each other's attraction, without entering into an intermediate ſtate of gas, by union with caloric: and in this way, it is probable, the nitrous acid is formed during putrefaction. The proceſs is as intelligible and eaſy to be conceived, as any inſtance

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of chemical connection whatever. The caſe, at the ſame time, is not by any means peculiar or unparalleled; for the union of carbone with oxygene, to form fixed air (carbonic acid gas) in the lungs, during reſpiration, and of hydrogene with oxygene, to conſtitute water in the ſame function, is brought about in an analogous way: and Profeſſor Mitchill ſuppoſes it is in this way that *animal and vegetable ſecretions are effected*, as there appears to be ſome machinery in their economy whereby the ordinary impediments to chemical union are removed, and compounds afforded thus, that are producible in no other way. This he ſuſpects to be chiefly effected *by depriving oxygene, hydrogene, and ſepton, of the proportion of caloric neceſſary to convert them to gaſes*; and thus bringing the uncombined elements into cloſer connection, with ſtronger appetites to adhere to other ſubſtances and to one another; and ſo, moſt probably, gum, mucus, bile, reſin, pus, ſugar, ſtarch, &c. are formed.

Hence it is apparent, that both during the life and after the death of organized beings, compounds are made that are not imitable by any art, or to be produced any where elſe, or by any other means, owing to the ſingularity of the circumſtances in which the component elements then and there exiſt. Among theſe animal products, the ſeptous (nitrous) acid, and the other combinations of ſepton, with the principle of acidity, have not generally been viewed in a proper point of light, either as reſpects their origin or properties. The alkaline quality was always thought to characterize putrefaction; and the exhalations from corrupting animal ſubſtances have ever been deemed to be ſome modification of ammoniacal gas. The extrication of this ſpecies of gas, in common caſes, though it appears highly improbable, may, however, poſſibly take place; but even upon the ſuppoſition that ammoniac ſhould be formed, yet the extrication of it, as will be ſhewn hereafter, would appear totally inadequate to the explanation of the phenomena aſcribed to it.

It is only ſaid, in addition to this, there is another compound, formed, at the ſame time, by the union of the principle of acidity with the ſame radical, and that, according to the proportion in which the former connects itſelf with the latter, will ſeptous oxyd, ſeptic gas, ſeptous acid, and ſeptic acid, be produced. The viſcera and muſcles of carnivorous and graminivorous animals contribute eminently to the formation of theſe; while, in the livers of fiſhes, and ſome other ſpecies of animal machinery, putrefaction diſengages ſepton by itſelf, which, joining with caloric, conſtitutes *mere ſeptous* (*azotic*) *gas* [*], as another occaſional reſult of this kind of diſorganization. According to the texture and compoſition of the animal or vegetable material, will the reſult of putrefaction be; the ſepton, in the ſimpleſt caſe, barely uniting with the matter of heat into ſeptous (azotic) gas; or, in other inſtances, combining with hydrogene into volatile alkali, or joining, under yet other circumſtances, with oxygene, in varied proportions, to form the ſeveral enumerated products.

It is ſtated, on the authority of the Dutch chemiſts [†], that the ſeptous (azotic) oxyd conſiſts of

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[*] Mitchill found by experiment, in the autumn of 1795, that the fluid diſtending the abdomen of a ſwine putrifying after being ſtrangled, was a mixture of ſeptous (azotic or phlogiſticated) and carbonic acid (fixed) airs.

[†] Deiman, Trooſtwick, &c.

63 parts of (ſepton), united with 37 parts of oxygene. The proportion of the principle of acidity is greater *in this chemical compound*, than in the atmoſphere, where it is *wholly diſengaged and ſeparate.* How then, it has been aſked, can *the baſe of vital air*, *the very principle of animation*, become ſo very deleterious as to excite diſtemper and deſtroy life, by merely combining in a ſmall over-proportion with ſepton? Juſt in the ſame way, it may be replied, that, by combining in a ſomewhat larger proportion, it conſtitutes, with the ſame radical, the more cauſtic and deſtructive ſeptous (nitrous) acid itſelf. There is no reaſoning *a priori*, from the known qualities of two ſubſtances, in their diſtinct ſtate, to what will be the qualities of the *tertium quid* they compoſe by union. It may be inquired, if theſe two elements are ſo prone to unite after death, why, as they are in conſtant neighbourhood in the animal ſolid, they do not aſſociate during life? It is probable in certain morbid caſes they do; and cancer, and ſome other eroding and incurable ulcers of the lungs, face, neck, uterus, &c. have been ſuggeſted as examples of its cauſticity when thus produced.

Notwithſtanding there are but four ſtages of combination diſcriminated betwixt ſepton and oxygene, yet it is not unlikely that between each there are intermediate degrees of connection; that, for inſtance, a given compound, divided into 100 parts, may have 99 of ſepton and 1 of oxygene, or 98 of ſepton and 2 of oxygene, and ſo on, or *vice verſa*, in all the poſſible varieties of combination. This enlarged idea of the ſubject will go a great way toward the explanation of the *degrees of poiſonous activity* in different caſes of contagion; the materials of which, though always of the *ſame kind*, may vary in their proportions, and impart to *that miſchievous fluid* more or leſs virulence and activity.

According to this doctrine, ſeptous acid ought to be capable of reſolution into atmoſpheric air. In the exploſion of gunpowder this almoſt happens, for during the inflammation the ſaltpetre is decompounded; and while the ſepton of its acid is ſet looſe, the oxygene joins the charcoal to form fixed air. It is not impoſſible that in ſome inſtances of imperfect exploſion, the ſeptous oxyd may be formed in this way.

When putrifying ſubſtances in cities and marſhes exhale this dangerous fluid, there is commonly a conſiderable degree of heat prevalent. In the city of New York, the common range has been ſtated to be between 75 and 85 degrees of Fahrenheit's ſcale; but theſe fluids may be, and often are, emitted in cooler temperatures; and where the decaying materials are moiſt and plentiful enough, the gaſeous oxyd may continue to riſe in the higheſt temperatures we experience in our latitude of 40 deg. 40 min. What has been thus ſtated, is therefore to be conſidered as only the ordinary range in common ſeaſons, wherein this ſpecies of air is produced from the remains of dead bodies expoſed to the viciſſitudes of the weather.

As to its production within doors, an opinion is entertained, that the human body, whoſe temperature is nearly the ſame in every ſeaſon, may produce it during the coldeſt part of winter; and in ſhips, priſons, and in ſome tenements of large cities, the proceſs ſeems to be conſtantly going on. The air ſo formed does not ſeem, however, to gain its utmoſt activity until the arrival of hot weather, *no degree of cold we are yet acquainted with being capable of fixing it, though ice very effectually ſtops its further formation from external ſources.*

Hence it is hoped the difference between the *contagious fluid* and *atmoſpheric air* will be apparent; the one being a *chemical connection*, whereby both the ingredients loſe their ſeparate qualities; while the other is a *mere diſtribution, or diſperſion of the particles of each among thoſe of the other*, poſſeſſing ſtill their diſcriminating qualities, and totally free from any combination with each other: the former brought about by reaſon of the near approximation or ſtronger attraction of the ingredients in the decaying body, before they combine with caloric enough to turn them to gaſes; while in the latter, ſuch is the coheſive power by which ſepton and oxygene, when once as gaſes united to caloric, ſtick to it, that the weaker attraction they have for each other cannot in ordinary circumſtances overcome it; and thus, in *the ſame temperature*, the elements may form ſeptous oxyd or not, according to their reſpective relations to other elements at the time, and the ſtrength of alliance by which they are bound to them. If the quantity of oxygene is greater in the oxyd than in the atmoſphere, it is not more ſurpriſing than in the example of arſenic, quickſilver, antimony, ſulphur, phoſphorus, and charcoal, acquiring great change of qualities, and becoming vaſtly more active by being charged with a ſufficient doſe of oxygene; for, like ſeveral of the enumerated ſubſtances, ſepton is both an *oxydable* and *acidifyable baſe*. That ſuch a preciſe proportion of the baſe of vital air ſhould be neceſſary to convert ſepton into an active poiſon, is not hard to comprehend, ſince without it ſepton is little better than a poiſon; it poſſeſſes no ſalubrious properties, and at beſt deſerves but the negative character of not being miſchievous.

What has been now offered is ſufficient to ſhow the nature and theory of theſe ſeptous and ſeptic compounds, and to make it appear that the ſalubrity of the atmoſphere, whoſe component parts are commonly disjoined or diſtinct, is ſpoiled immediately on their forming a junction, or becoming *chemically* combined.

This concluſion is confirmed by the following obſervations of Dr. Beddoes *: "The nice balance of attraction between the two conſtituent parts of the atmoſphere deſerves notice. Theſe two ſubſtances, when cloſely united, form nitrous acid. If, therefore, they were not by ſome circumſtances prevented from uniting cloſely, all the oxygene, with part of the azote, would be changed into a highly concentrated acid, and the waters of our globe would be converted into *aqua fortis* (ſeptous acid)."

And this is a perfect fulfilment of what Fontana † conjectured long ago: "Thus then the reſpirable and wholeſome air of the atmoſphere is compoſed of nitrous acid alone; but it is united with more or leſs phlogiſton, which varies the quality of it, not only in proportion to its quantity, but alſo in proportion to its combination; becauſe, after all, phlogiſton itſelf is a compound of ſeveral principles, preſenting itſelf to us under a thouſand different aſpects, and which, combined variouſly with other ſubſtances, forms all the factitious airs with which we are acquainted.

"If the nitrous acid is convertible into air, and if the atmoſphere is compoſed of this acid decompoſed, and deprived of its natural phlogiſton, it might happen, in this view of the ſubject, that common air, in undergoing decompoſition, ſhould change to the nitrous acid, and might even form ſaltpetre itſelf: it is certain that nitre cannot be produced but in open air; that it is not formed but in places where phlogiſton abounds; and that it is a ſalt highly charged with phlogiſton."

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* Conſiderations on the medicinal uſe and on the production of Factitious Airs, p. 18.

† Recherches Phyſiques, p. 165.

The Indentity of what has been termed Contagion, and Marſh Miaſmata.

It is known that onions, plants of the tetradynamous claſs, the paſte or glutinous part of bread, &c. afford ſome reſults upon analyſis greatly reſembling thoſe which animal ſubſtances yield. When natural productions of theſe ſorts go into ſpontaneous decay, it may be expected they will yield aëriform products, nearly allied to the animal claſs, if not quite the like. Maize and rice, conſiſting almoſt wholly of amylaceous matter, emit very little or no azote, and ought therefore to be moſt wholeſome articles of diet. The flour afforded by wheat, rye, and buck-wheat, contains a pretty large proportion of glutinous matter, abounding with azote, and ſhould on that account be more prone to excite uneaſineſs in the ſtomach and bowels, by running, in certain caſes, into a putrefactive ſtate. Cabbage, onions, muſhrooms, &c. ſhould alſo, when taken as food, be followed by much the ſame conſequences as meats. It is very difficult to draw the diſcriminating line between animal and vegetable nature; and it is uncertain whether the animal reſemblances may not extend much farther than the *Fungi*, *Gramina*, and *Tetradynamia*. So far as plants or their parts

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approach in their nature and compoſition to animals, will they be capable of reſolution into ſimilar products. The difficulty ſtarted concerning vegetable putrefaction, as affording reſults eſſentially varying from animal, is ſo far explained away, and reconciled to fact.

The favourers of this diſtinction, it ſhould ſeem then, have adopted their opinion too haſtily, having never aſcertained that what they call *marſh miaſmata* were the reſult of pure and unmixed vegetable putrefaction. In declaring that it was ſo, they have ſet up an hypotheſis, and aſſumed a principle without proof or even probability to ſupport it. I ſhall take, as inſtances of countries expoſed to theſe vegetable miaſmata, Bengal, on both ſides of the Ganges, Louiſiana, overflowed by the Miſſiſſippi, and Egypt, covered annually by the Nile. Theſe tracts of country, after the evaporation or withdrawing of a conſiderable part of the waters, are found to have an unhealthy air. This unwholeſomeneſs is not imagined to proceed from any alteration in the exiſting atmoſpheric ingredients; nor in that natural diſtillation called evaporation, is it imagined that the atmoſphere elevates, by chemical attraction, any thing but pure water. As long as this continues to be the caſe, there is no uncommon complaint of ſickneſs. But by and by the mud begins to be bare, and the air grows peſtilential. Hence, it is ſaid, proceeds the *marſh miaſma*, from the mud and ſlime. Let us then inquire what this mud or depoſition from the water is. Is it clear vegetable matter? It is known to naturaliſts, that the *ſpecies* of large animals are comparatively *few*. It is likewiſe known, that their *numbers* are comparatively *ſmall*. Nor is it leſs evident creation teems more particularly with animal exiſtence in the warmer latitudes. The myriads of wild bees, locuſts, ants, cockroaches, ſand-flies, muſquitoes, which travellers have noticed, and hundreds of other *inſect ſpecies*, of which they knew neither hiſtory nor name, muſt, by their annual deaths, make an incalculable maſs of animal putrefaction. The frogs, newts, lizards, alligators, and other amphibious creatures, which yearly expire, add greatly to the heap. The different verminous kinds, inhabitants of water and mud, contribute mightily to the ſum. And to all this muſt be added the vaſt amount of fiſhes which die natural deaths, or are left to periſh or rot upon the ſhores. The remains of all theſe animal productions are mingled with the waters of theſe large rivers, as they waſh and cleanſe the countries they paſs through, from their ſources in the mountains to their diſemboguement in the ocean; and yet, while ſuch is the hiſtory of the mud left by the receding rivers, and ſuch the reaſon of its extraordinary fertility, the effluvia ariſing from it has been conſidered as ſomething different from animal exhalation.

The caſe of ſtagnating water in ponds and ſwamps is preciſely ſimilar, abounding in animal productions, which undergo putrefaction during the evaporation of the water, and the greater heat the ſurface of the mud acquires, when that proceſs begins to abate.

The ſame thing occurs ſometimes during the long calms ſhips endure off the weſtern coaſt off Africa, where the relics of animals, which float within a few fathoms of the ſurface, now riſe to the top, and form a putrid ſcum on the ocean water.

It is indeed queſtionable, whether there exiſts in nature an inſtance of any thing like unmixed vegetable putrefaction, upon a very extenſive ſcale.

Bogs of turf and of peat-moſs come neareſt to it; and the water iſſuing from thence is very palatable and wholeſome. The formation of ſoil or *mould* in foreſts is an analogous proceſs, but not of itſelf particularly noxious; for wherever much morbid exhalation ariſes from it, there is ever an admixture of animal matter; and to this quickening of the putrefaction of manures does newly-cleared land owe its abundant fruitfulneſs.

Obſervations and Facts, proving the Identity of Cauſe, in the Production of Fever and certain other Diſeaſes.

CULLEN differed in opinion from Sydenham, and thought it probable that in each of the ſpecies of diſeaſe enumerated in his Noſology, the contagion was of one ſpecific nature *. He thought it probable that contagions were not of great variety, ſince they ſeemed to proceed much from one common ſource. "As to miaſmata, we know," ſays he, "only one ſpecies of it, which can be conſidered as the cauſe of fever, and from the univerſality of this it may be doubted if there be any other." He conceived it did not differ in kind, but varied only in the degree of its power, or perhaps as to its quantity in a given ſpace †. Neither contagion nor miaſmata were, as he imagined, of great variety ‡: and both ariſe from putreſcent matter §. The changing of the type of fevers, by tertians and quartans becoming quotidians, quotidians turning to remittents, and remittents altering to thoſe of the moſt continued kind, appeared to Cullen to evince, not only that every fever conſiſted of repeated paroxyſms, differing from others chiefly in the circumſtances and repetition of the paroxyſms; but that it was fair and proper to take a fit of pure intermittent as an example and model of the whole *.

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* Practice of Phyſic, ſect. 79. † Sect. 84.
‡ Sect. 85. § Sect. 86.

Balfour, in a treatiſe on putrid inteſtinal remitting fevers, comprehends the fevers called nervous, contagious, low, putrid, and malignant, together with many febrile complaints in the Eaſt-Indies, which appear with peculiar local affections. He aſcribes this claſs of ailments to a putrified ſtate of the *mucus lining the inteſtines*, which being abſorbed into the blood, cauſes the febrile ſtate. *This mucus* (he thinks) *receives the infection firſt by means of contagious matter taken into the ſtomach with the ſaliva* †.

Wade ‡ conſiders fevers and dyſenteries to be ailments of a kindred nature, and prevented and cured in the ſame way. He conſiders fevers univerſally to ariſe in thoſe latitudes from the bowels and the matters contained in them; and are to be cured of courſe by evacuations. He alſo thinks puerperal fever may always be prevented by effectual evacuations from the bowels after delivery.

Chiſholm, in his obſervations on the malignant peſtilential fever which raged at Grenada, in the Weſt-Indies, remarks: " Although the contagion ſeemed to vary much in different deſcriptions of people, it is highly probable that the virus of the contagion itſelf was uniformly the ſame, only variouſly modified by particular conſtitutions, habits, or mode of living, &c."

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* Practice of Phyſic, ſect. 32.

† Monthly Review for July 1794, p. 336.

‡ Diſeaſes of the Eaſt-Indies, p. 130.

Writers have made a diſtinction between intermitting and remitting fevers. This may be of uſe in medical deſcription and converſation; but from intermittents varying their types, and after a while becoming remittents, and then aſſuming the continued form, and *vice verſa,* it is argued fairly that they all ſpring from one common cauſe.

Fordyce * declares, that he knows from his own obſervation, which is corroborated by the authority of others, that *intermitting fevers are infectious;* and this is another trait of reſemblance between the two forms of fever. And Jackſon † obſerved the changes from intermitting fever to dyſentery, and from dyſentery to intermitting fever, on this continent, ſo frequent in Auguſt and September, that he had no doubt of their dependence on the ſame general cauſe. The diſeaſe deſcribed by Zimmerman ‡, as occurring in Switzerland in 1765, ſhews the connection between *putrid fever* and *dyſentery*. The analogy between the two diſeaſes is very ſtriking, and appears to indicate reſpiration, injured by a bad ſtate of the atmoſphere, combined with local affection of the alimentary canal. When the bowels were eaſy, the pulmonic organs alone were affected; the diſeaſe ſeems to have been what he calls the putrid pleuriſy of Louſanne.

And if it has been explained, how the difficulty of animal contagion and vegetable miaſmata can be got over and entirely reconciled, then *one general*

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* Diſſertation on Simple Fever, p. 111.

† Fevers of Jamaica, p. 331.

‡ Treatiſe on the Dyſentery, ch. 1—2.

neral cauſe will be acknowledged to prevail; and according to the proportion of the ingredients entering into the contagious combination; according to the ſparſe or concentrated ſtate in which the product is applied; according to the part or parts of the human frame to which the application is made; or, according to the readineſs or ſlowneſs with which they take upon themſelves morbid action, and according to the co-operation and concurrence of other circumſtances, will the effect brought on by the agency of this cauſe be. So that the recurring to a multiplicity of contagions appears both unneceſſary and unphiloſophical.

Thus ſays Merli, in his deſcription of the contagious epidemic fever at Naples, in 1764: "This miſchief, contagion, or poiſon, or by whatever name you are pleaſed to call it, produces in ſome a *malignant continued fever;* in others a *malignant double tertian*, or a *malignant bloody flux.* It ſometimes attacks the head; at others, ſeats itſelf in the breaſt, in the kidneys, or in ſome of the bowels; and wherever ſeated, produces the moſt violent and malignant ſymptoms."

"The diſorders," ſays an intelligent writer*, "that prove fatal to ſoldiers and Europeans in general in the Weſt-Indies, are of two kinds, namely, *fevers* and *fluxes.* They are the concomitants of armies in all parts of the world; but in tropical climates they rage with peculiar violence. There appears to be an intimate connection between them, for *they are frequently combined together, often interchange with each other, and it rarely happens that one is epidemic without the*

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* Hunter's Obſervations on the Diſeaſes of the Army in Jamaica.

other." He alſo affirms *, that "there appears to be an intimate connection between the *intermittent* and *remitting fevers* of Jamaica: the intermittent often running into the remittent, and the remittent ſometimes terminating in an intermittent." He declares further †, that "there ſubſiſts an intimate connection between *remitting fever* and *dyſentery;* the one frequently changing into the other, and the two often complicated with various degrees of violence. In ſome caſes the dyſentery ends in a fever, though much oftener the fever terminates in a dyſentery, eſpecially among the ſoldiers."

"From one cauſe, from the ſame infection," ſays Lind ‡, "I have frequently known to proceed what may be termed, from outward appearances, the *yellow patechial* and *miliary fevers;* and while, in a few, the contagion aſſumed an *intermitting* form, and was mild, in others it raged with a *conſtant* and violent fever."

"The influence of jail-infection || is much more extenſive than is generally ſuppoſed. Of a ſimilar nature is the diſeaſe we frequently read of in the public newſpapers, under the names of the *ſcarlet, purple*, and *ſpotted fevers*, which often depopulates cities, and ſometimes even whole countries."

Cleghorn § informs us that there ſeems to be a near alliance amongſt all the ſucceeding diſeaſes prevailing at Minorca. "Thoſe who have the *raſh* or *eſſere* to a great degree are very liable to *tertian fevers:* on the other hand, in the paroxyſms of tertians, theſe cutaneous eruptions are apt to

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* P. 14.

† P. 218.

‡ Eſſay on Seamen, p. 265.

|| Ibid. p. 323.

§ Diſeaſes of Minorca, ch. ii.

break out. The *cholera morbus* ſometimes hath its regular periods like a *tertian*, as the paroxyſms of tertians are frequently attended with a cholera. Sometimes a *tertian* turns into a *dyſentery*, or a dyſentery becomes a tertian; and when one of theſe diſeaſes is ſuppreſſed, the other often enſues: nor is it uncommon for *dyſenteric fevers* to put on the form of *tertians*, and for the fits of tertians to be regularly accompanied by gripes and ſtools."

That the diſeaſes produced by contagion and miaſmata originate from the ſame cauſe, is countenanced alſo by Gardiner *, who coincides with the phyſicians of obſervation and experience, that marſh miaſmata can acquire a power as noxious as human contagion; and when it does ſo, the diſtempers cauſed by it are nearly the ſame. Sir John Pringle was of this opinion, and ſo was Count Carburi. And what is more to the point, Dr. Mackenzie, who had reſided a long time at Smyrna, and a longer at Conſtantinople, declares the common epidemic peſtilential fever there, is the ſame with the jail or hoſpital-fever of England; and when this ſame diſtemper grows more virulent, with buboes and carbuncles, they call it plague.

Cleghorn † further aſſerts: "Theſe *tertian fevers* have as good a right to be called *contagious*, as the meaſles, ſmall-pox, or any other diſeaſe; for although in that ſeaſon there certainly is a peculiar diſpoſition in the air to affect numbers in the ſame way, yet thoſe who are much converſant among the ſick, are moſt liable to catch the diſtemper."

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* See Animal Economy, p. 187.

† Diſeaſes of Minorca, note to p. 132.

That

That the Cauſe of Contagion, and of many endemic and epidemic Diſeaſes, is ſome Chemical Combination of Septon with Oxygene.

THE effluvia from putrefying ſubſtances, which conſtitutes contagion, is neither hydrogene gas, nor any combination of it with ſulphur, charcoal, or phoſphorus. Theſe compounds are very volatile and diffuſable, and form a large part of the diſagreeable odour or abominable ſtench of decaying bodies. The ſtinking ſmell of ſubſtances is quite a different thing from infection: nor can carbonic acid air be the contagious material, though that exhales abundantly from ſome ſources of corruption. It has been imagined, that ammoniacal gas was the injurious production, either by itſelf, or in combination with ſomething elſe; but the ſenſible qualities of this, although it ſupports flame, and is miſcible with water, ſerve ſufficiently to characteriſe it, and ſhew it is not the deleterious cauſe in queſtion. Beſides its miſcibility with water, and capability to maintain flame, though very faintly, alkaline gas poſſeſſes enough of peculiar qualities to diſtinguiſh it from every other animal production. We ſhall mention two of them: 1. When ammoniacal gas is mixed with water, it imparts to it a ſtrong alkaline tincture; inſomuch that a water may be prepared in this way, having a ſtronger alkaline ſmell than any ſpirit of ſal ammoniac at all. 2. Whenever alkaline air meets with carbonic acid gas, a combination of the two fluids takes place immediately, even in their aërial form, and concrete into oblong and ſlender chryſtals, which croſs each other, and cover the ſides of the veſſel in which the experiment is made, in the form of a net-work; the chryſtals being of the ſame kind of volatile ſalt, obtained in a ſolid form, by the diſtillation of ſal ammoniac with fixed alkaline ſalts. Hence, if ammoniacal gas be ever extricated during putrefaction, it would inſtantly diſcover itſelf by imparting an alkaline flavour to water; or, by combining with the fixed air, evolved at the ſame time, will combine into firm chryſtals of volatile alkali. This, therefore, cannot conſtitute the matter of contagion. *This contagious cauſe we ſuppoſe to be ſought for in the combinations of ſepton with the acidifying principle, and to manifeſt itſelf in the ſeptous oxyd, and the vapours of the nitric acid itſelf:* and in this view of the matter can we account for the production of contagious diſeaſes in different parts of the world, wherever the cauſes favouring the production of theſe compounds exiſt.

Upon this idea, the occurrence of the epidemic in this city laſt ſummer may admit of a ſatisfactory ſolution; from the exiſtence of the collections of vegetable and animal ſubſtances in the different diviſions of the city, and in a particular manner in that part of it where the malady raged with peculiar violence; ſince, on examination, it has been found, that there exiſted in that neighbourhood large heaps of manure, collected by the ſcavengers from the ſtreets and avenues of the city, and which were in that ſituation, undergoing the neceſſary diſorganization for agricultural purpoſes. Now it has been pretty fully ſtated, that under ſuch circumſtances, thoſe ſeptous compounds, which are the immediate cauſes of contagious and infectious ailments, are uniformly extricated by the application of heat and moiſture; and when once ſo formed, their influence on the neighbouring inhabitants is eaſy of conception.

An analagous influence from the marſh effluvia ariſing from the borders of the Onondago lake, is related by Vandervoort *.

"The marſh effluvia in this weſtern territory, in many places, and particularly in this place, operates ſo powerfully on the human body, as to induce a paroxyſm of an intermittent, in the courſe of four or five hours, and frequently death the ſeventh day.

"From ocular obſervations in theſe marſhes, it appears that the poiſonous effluvia is generated from the putrefaction of vegetable matter, which, in its reſolution, undergoes certain changes, which produce this noxious air. It is alſo evident that this air does not operate while the marſhes are inundated."

Moores † informs us, that in the ſtate of Maryland, where the marſhy grounds are more extenſively prevalent, remitting and intermitting fevers prevail; and both diſeaſes he aſcribes to the ſame cauſe, differing in degree. "Hoc vero ex obſervatione propria edidici nempe cum in Marilandia, æſtivus et autumnalis calor minor quam ſolitus ſit, tum populi in locis paludibus vicinis degentes febribus intermittentibus tantum obnoxii ſunt, quando autem æſtatis et autumni calor intenſior æſtuet, tunc febres remittentes his ipſis locis epidemicæ graſſantur.

"In regionibus Marilandiæ calidioribus qualis Carolina eſt, paludes ſolis radiis ferme excoquuntur, ibique febres remittentes quam in Marilandia multo gravioribus ſymptomatibus ſtipantur et proprius ad

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* Analyſis of Balſton mineral ſpring water, p. 17.

† Tract. Inaugural. de Febre Remit. Marilandica.

typhum icterodem accedunt. Monſtrant hæc exempla quantum febres cum ejuſdem tum diverſarum regionum ſecundum tempeſtatis calorem varient. Hæ autem varietates modo indirecte a calore pendent quippe paludum miaſma pro cauſa omnes agnoſcunt et ſecundum vim ejus febres remittentes vel intermittentes ſæviant; vis vero miaſmatis ad tempeſtatis calorem ſemper quadrat."

Dr. Valentin, who formerly reſided in Cape François, in the capacity of phyſician to the camps and armies of St. Domingo, and who was in Norfolk in Virginia during the ſickneſs of 1795, in a letter to Profeſſor Mitchill, has the following comparative remark on the diſeaſes of the two places: "They offer the like train and concomitancy of ſymptoms: I have here followed the ſame method as there, with an equal ſucceſs when I was called in ſeaſon. I do not conteſt about the word *yellow fever*; that I conſider but as an effect, or a ſymptom, for it is not a new malady." He adds alſo his entire conviction of its local origin in Norfolk, and other ſea-ports of the United States.

The contagious fluid emitted from living bodies is moſt plentifully conveyed in the breath, perſpiration, and ſtools. It has been ſaid to have a peculiar ſmell, and capable of being diſtinguiſhed from all other known odours. They who have had infectious air freſh in their noſtrils have called it an earthy, diſagreeable ſmell, affecting in ſome degree the organ of taſte, and extending down into the ſtomach: ſome have compared it to the vapours iſſuing from a newly-opened grave, but without the cadaverous ſtench; others think it reſembles the effluvia of rotten ſtraw, and others again are of opinion it is like the exhalations from confluent ſmall-pox at the turn of the puſtules.

From the circumſtances in which it is emitted, it is preſumable it is ſeldom admitted to the organ of ſmell in its *pure form*, but is generally accompanied with ſome other gaſeous emanation floating about with it. Perhaps it is impoſſible to obtain it in a pure form, but by an artificial proceſs; and this may be the reaſon of the diverſity of opinions concerning the odour aſcribed to it, which is probably not ſo much occaſioned by the contagious fluid itſelf, as by the other matters that are frequently extricated at the ſame time with it. After diffuſion through the air to ſome diſtance, it ſeems incapable of exciting any ſenſation at all in the organ of ſmell. From this inodorous quality of it, added to its capacity to ſupport flame, may ſome idea be formed why it has hitherto eluded the ſearch of inquirers.

The facts related by Mr. Martin, and by Mr. Townſend, concerning the vapours riſing from the ſaltpetre ſoils of Bengal and Spain, and their power of producing fevers, apply with great force here. They are nitrous earths naturally formed. The filth collected in the ſtreets of large cities is a nitrous ſoil alſo. The effluvia from the ſaltpetre ſoils of cities produces effects very ſimilar to thoſe obſerved in the neighbourhood of natural nitre-beds. This is verified moſt ſtrikingly, as before remarked, in the diſeaſe endemic in New York in 1795. The inference is, that the ſeptic (nitric) vapours, according to Thouvenel's concluſion, are in both caſes the cauſe of the conſequent diſeaſes.

The Operation of the Cauſes of theſe endemic and epidemic Diſeaſes on Vegetation.

THIS is a ſubject of the greateſt importance, as it involves a material article of the police of crowded cities: for ſhould it appear that the vegetable economy was capacitated to diſarm theſe compounds of their baneful properties, the joint co-operation of convenience and uſefulneſs would ſtimulate the officers of government of theſe places to diſſeminate vegetable life with as much zeal, as the prejudice of ignorance has ſupported the meaſure of exterminating it from the ſtreets and public walks of the citizens.

No direct experiments, however, have yet been made on this ſubject; but from the phænomena of the mitigation of the Samiel and Harmattan blaſts in Africa, on their paſſing over tracts of country cloathed with vegetable verdure, it is highly probable they have an eſſential influence in altering or decompoſing the elements of ſuch peſtilential fluids.

Its Phyſiological and Medical Operation.

HAVING, as we hope, aſcertained the cauſe of moſt endemic and epidemic diſeaſes, and the ſources of their formation in the various ways we have conſidered them; we come now more immediately to the application of theſe cauſes on our bodies; and in this view of the ſubject we ſhall conſider the operation of them on different parts of the body.

The Operation of the Gaſeous Oxyd and Septous Acid Vapours on the Lungs, including Brute Animals as well as Man.

THE operation of theſe cauſes on the lungs is accompanied, according to their degree of continuance, with the following ſymptoms:—Hoarſeneſs, cough, catarrh, excretion of mucus from the larynx or bronchia, laſſitude, languor, ſhivering, impeded oxygenation of the blood, the contractions of the heart diminiſhed, intermiſſion or ſlowneſs of the pulſe, the colour of the hands and arms brown, livid, or black, laxity of the muſcles, hæmorrhages, anxiety, coldneſs of the extremities or of the whole body, ſtupor, coma, delirium, ſuffocation, and death frequently direct on the firſt attack; the blood in a like condition as in ſubmerſion or ſuſpenſion. Though the effects now enumerated ſeldom all occur in any one caſe, ſome or other of theſe ſymptoms will occur, more or leſs, in different perſons, dependent on the concentrated form in which the cauſe is applied, the duration of its continuance, and the facility with which the patient's conſtitution accommodates itſelf to the operation of ſuch a new ſtimulus. And in this way it is, that of a number of individuals, labouring under the influence of cauſes of this ſort, in like ſituations and circumſtances, one ſhall have an aggravated, another a mild, and a third no diſeaſe whatever; and ſo on in all poſſible degrees of violence or mildneſs.

For a more clear and ſatisfactory illuſtration of theſe remarks, I ſhall ſelect, from medical hiſtory, a few well-marked and deciſive inſtances of diſeaſes induced by breathing an air thus vitiated.

Chiſholm's * hiſtory of what he calls an uncommon epidemic fever obſerved in the iſland of Grenada, may be conſidered as a fair exemplification of the effects produced by this modification of atmoſpheric air, mingled perhaps with other non-reſpirable airs, and acting on the lungs of the ſoldiers, ſickening in the barracks of St. George's, a remarkably unhealthy ſpot, *ſurrounded by marſhes.* "The general type of the fever was that of a quotidian intermittent, but ſo extremely irregular as not to admit of a reference to any of the common ſpecies. It was truly anomalous, and ſo inſidious as to endanger the life of the patient before any apprehenſion could be entertained of its fatal tendency. In almoſt every caſe, the patient ſeemed in a ſtate of very great anxiety at all times, with eyes inflamed, and a little protruded; a ſtrong expreſſion of depreſſion of ſpirits in his countenance; a very great degree of debility; and a ſenſe of wearineſs, as if he had undergone exceſſive fatigue. But the ſymptoms which moſt troubled the ſick, during both the paroxyſm and the intermiſſions, if they can be properly called ſuch, were an intolerable headach, with a throbbing of the temples, and a lethargic heavineſs. During the intermiſſion, whilſt the patient was labouring under all or moſt of theſe ſymptoms, his ſkin was preternaturally cool; his pulſe ſmall, quick, and hard; and his whole body covered with a clammy moiſture. The paroxyſm generally came on ſometime between eight and twelve at night; and its approach was indicated by a very great increaſe of the coldneſs, with ſhivering. Theſe were ſoon ſucceeded by violent heat, increaſed anxiety, and headach, and very frequently by delirium. It continued two, three, or four hours, and terminated in profuſe diaphoreſis; but, contrary to the uſual form of intermittents, on the ceaſing of the diaphoreſis, the patient continued afflicted with anxiety, headach, &c. to the degree I have mentioned. The paroxyſm in ſome was marked with infinitely greater violence than in others. In the caſe of one ſoldier, the paroxyſm began about twelve o'clock at night, with all the moſt violent ſymptoms, at once a deadly coldneſs of the body, and exceſſive delirium. Theſe, conſtantly increaſing, terminated, in about two hours, in total inſenſibility, coma, and death. In a few caſes, very little intermiſſion could be perceived throughout the whole courſe of the diſeaſe: in theſe there was a continual alternate ſucceſſion of ſhiverings and fluſhings, with a diſagreeable clammineſs on the ſurface of the body, which never afforded relief. When, in ſuch caſes, any thing like diſtinct intermiſſions could be obſerved, they occurred at or a little before noon, and continued one or two hours; but in the others, the periods of ſhivering and diffuſion of heat returned ſo rapidly, that ſcarce any interval could be perceived. The proſtration of ſtrength brought on by them was aſtoniſhing; and it was obſerved too, that the patients who laboured under the diſeaſe in this form had a much more ghaſtly countenance, ſighed and moaned more, were infinitely more reſtleſs, were more ſubject to raving, and had more of a dirty yellow ſuffuſion over the ſkin, than the reſt.

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* See Duncan's Medical Commentaries for 1792, p. 267, et ſeq.

"In moſt of the caſes reſpiration was extremely difficult; and on ordering the patients to make a deep inſpiration, they were ſuddenly checked by pain more or leſs acute, which, however, they could not refer to any particular place, except in a few inſtances, when it was found moſt troubleſome at the pit of the ſtomach, ſtretching to the hypochondria and ſpine. Some alſo complained of a *rawneſs*, as it were, from the throat to the ſtomach, or, as they expreſſed it, " a rawneſs and burning of their inwards."

" A yellowneſs on the ſkin was by no means a conſtant ſymptom. The ſuffuſion was general over the body; ſometimes of a deeper hue, and ſometimes, particularly about the eyes and on the neck, approaching to a livid colour.

" Diſſections, in theſe caſes, proved the whole inteſtinal canal to be ſound."

Lind * gives an account of a diſeaſe, operating pretty much in the ſame way, though with leſs violence, on board ſeveral ſhips in the Britiſh navy in 1759. " The fever which raged in all theſe ſhips greatly affected the breaſt. Some who were ſeized with it, as if they had been under a ſalivation, ſpit up ſix or eight pints of a thin phlegm in forty-eight hours; and, to prevent ſuffocation, were obliged to have their heads ſupported by pillows. Their blood was extremely viſcid and glutinous. This I obſerved even during the laſt ſtage, in a perſon from whom it was then neceſſary to take blood for a pain in the breaſt, greatly impeding reſpiration. The head was affected often with a heavineſs, and dull ſenſe of pain, ſeldom with a delirium. Cough, ſpitting, and pricking pains of the breaſt, were the moſt univerſal complaints, &c. The attack of this infection began with ſhivering, ſucceeded either by pain of the head or breaſt; ſeldom by an univerſal pain in the limbs, but moſt frequently by a tightneſs of the breaſt and cough, which laſt raiſed the acute pains in the cheſt. Several who recovered were afterwards diſtreſſed with a dulneſs of hearing; many relapſed. A midſhipman, after being able to ſit up for ſeveral days, fell again into the fever, which was accompanied with convulſions, and expired in thirty hours after the laſt attack, when his body was found covered with patechiæ: a few died conſumptive, being exhauſted by the vaſt diſcharge in ſpitting. In four or five perſons, there were ſymptoms of malignity; and out of above a hundred patients received into the hoſpital from thoſe ſhips, eight died of the fever. The diſtemper, if it had occurred elſewhere than in the ſhips, might perhaps have been judged ſolely inflammatory, and to have proceeded from cauſes very different from the real ones."

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* Diſſertation on Fevers and Infections, ch. i.

Fordyce, in his Diſſertation on ſimple Fever *, has the following obſervations, which tend to the corroboration of this argument. "When the attack is fatal, it ſometimes kills in five minutes: ſometimes it requires half an hour; ſometimes longer than that time. While the patient is yet ſenſible, violent head-ach, with great ſenſe of chillineſs, takes place; the extremities become cold and perfectly inſenſible; there is great proſtration of ſtrength, ſo that the patient is incapable of ſupporting himſelf in an erect poſture. He becomes pale; his ſkin of a dirty brown, and he is ſoon inſenſible to external objects: the eyes are half open; the cornea ſomewhat contracted, and the

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* Page 181.

patient goes off very ſoon: the pulſe is diminiſhed, and at laſt loſt, without any frequency taking place; but if it be long before he dies, the pulſe becomes exceſſively ſmall and frequent," &c.

The effects induced by expoſure to an atmoſphere, charged with the cauſes of theſe diſeaſes, as *pointedly* elucidating their operation on reſpiration, may be ſeen in Mr. Martin's account of the air of ſome parts of Bengal.

It may not be amiſs to inveſtigate *the operation and influence of theſe cauſes on brute animals.*

From the production of diſeaſes in the human conſtitution, by expoſure to marſh miaſmata, and other like decompoſitions of animal and vegetable ſubſtances, it may appear highly probable that the *rot in ſheep*, kept in low grounds, is analagous to the intermitting, and like diſeaſes of the human ſpecies, and excited by the ſame cauſes. And a like inveſtigation might prove that *the bloody murrain*, which ſometimes prevails among *cattle*, is occaſioned by a ſimilar contagious cauſe, operating and producing an affection ſimilar to our *dyſenteric* fever, &c.

But that, while our habits ſuffer the operation of theſe cauſes in their ſuperior degree of operation, brute animals have analagous experience, may be inferred from the following facts:

Sorbait, of Vienna, relates that, during the plague, "*larks*, ſo numerous in Auſtria during the autumn, were wholly wanting, ſo that not a ſingle one could be met with; and *tame birds*, kept in cages, *all died*. Homer* mentions the death of *dogs* and *mules*, as the forerunners of the peſtilence in the Grecian camp before Troy.

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* Iliad, i. 69.

Thucydides * obſerved the pernicious and deadly effects of the atmoſphere, during the plague at Athens, in the ſecond year of the Peloponeſian war, upon *birds* and *beaſts*, and particularly on *dogs*.

Facts of this kind were not wanting during the prevalence of our late epidemic. It is ſtated to me, from undoubted authority, that *at the Belvieu Hoſpital*, the *fowls* and *chickens*, which fed about it, and like other poultry came occaſionally into the hoſpital, (perhaps drank, and picked up crumbs about the houſe,) all ſuddenly died without any oſtenſible cauſe; on diſſection, the appearances were ſimilar to thoſe of the human ſpecies who have died of putrid diſeaſes. And in a part of the city, where there exiſted comparatively a ſmall proportion of the epidemic influence, the *ducks* kept in yards, and which received the uſual attendance as to food, all died off in ſuch a manner as to excite the remarks and ſurpriſe of the inhabitants.

Fowls, in ſome of the yards, ſickened, and ſome died; but after a while, the ſurvivors experienced no inconvenience. Bruce mentions the deadly effects of the Simoom blaſts, in the African deſerts, upon all breathing creatures. Cleghorn obſerves, that in ſome of the vallies of Minorca, beaſts, as well as men, ſuffer; and it is related by reſpectable authority, that *horſes* have been incommoded by the autumnal air of Onondaga, for ſome time after being carried on to the low lands.

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* Book ii.

On

On the Alimentary Canal, or Stomach, and Inteſtines.

How the aforeſaid Septous Combinations may be conveyed into the Alimentary Canal of living Animals; or generated there from the Corruption of the Food; and of the Effects they produce in both Caſes, by acting on the Stomach and Inteſtines.

1. FROM the properties of the cauſes of contagious and infectious diſeaſes, then, we infer the occaſional operation of theſe in the alimentary canal, by their introduction *by the ſaliva and watery parts of our food:* in corroboration of which mode of operation, we are preſented with the following reflections and facts from their reſpectable authors.

Gardiner obſerves, that the manner in which the cauſes of certain malignant fevers, ariſing from marſh miaſmata, human or ſpecific contagion, get into our habit, is by the noxious effluvia taken in with the air in reſpiration, mixing with the *ſaliva*, and, by deglutition, conveyed into the ſtomach, where by certain changes wrought on the gaſtric fluids, and their particular ſtimulus on the nerves of the ſtomach and bowels, they prove the cauſe of fevers, differing from one another according to the nature of the infectious exhalation. "This I have always thought to be the moſt probable way that infections are received by us, and of their acting on our ſyſtem, in the production of fevers *."

This opinion of the miſcibility of the infectious effluvia of malignant fevers, with the *ſaliva*, and of its afterwards paſſing into the ſtomach, is upheld by Turner, phyſician to the military hoſpitals in the Weſt-Indies, in a letter to Sir John Pringle, who ſays, that he eſcaped the infection of the hoſpital fevers by chewing tobacco during the time he was on his viſits to the men in the hoſpital, imagining that all putrid and contagious effluvia entered and infected by the *ſaliva*, which he took great care not to ſwallow whilſt he viſited the ſick [*].

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* Animal Economy, p. 196.

Lind believed in this mode of receiving contagion, who ſays, " Swallowing the ſpittle in infected places is juſtly deemed a means of ſooner acquiring the taint, upon which account neither the nurſes nor any one elſe ſhould be ſuffered to eat in the hoſpital [†]." And he relates an occurrence which may unqueſtionably be inſtanced as operating in this manner :—" A company of gentlemen belonging to his Majeſty's ſhip the Phœnix, taking the diverſion of hunting and ſhooting at the mouth of the river Gambia, by following their game into a large ſwamp, were all of them affected by its putrid effluvia. They were immediately ſeized with ſickneſs, vomiting, head-ach, and a conſtant hawking and ſpitting from a diſagreeable ſmell which (as they expreſs it) ſeemed to remain in their mouth and throat. Upon returning to the ſhip, each of them was ordered a vomit, which immediately removed all thoſe complaints [‡]."

And again [||], " I am apt to think, that an infection from whatever impure fountain it is derived, does firſt diſcover itſelf by affecting the ſtomach and inteſtines."

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[*] Med. Annot. vol. v. p. 472.

[†] On Hot Climates, p. 111.

[‡] Ibid. p. 138.

[||] On Fevers and Infections, part II. p. 65.

Balfour's opinion corroborates this argument, as we have ſeen in our collection of obſervations and facts proving the identity of cauſe in the production of fever, and certain other diſeaſes *.

Ruſh † relates, that "in ſmall rooms, crowded, in ſome inſtances, with four or five ſick people, there was an effluvia that produced giddineſs, ſickneſs at ſtomach, a weakneſs of the limbs, faintneſs, and, in ſome caſes, a diarrhœa."

Mitchill relates an inſtance of a gentleman who received the fumes of a dyſenteric purging: ſome uneaſineſs of the ſtomach, and qualmiſhneſs, came on, which, in a few hours, ended in a *looſeneſs*. A ſimilar indiſpoſition was brought on in another, by receiving the fumes of a corrupting corpſe. In both theſe inſtances, it appears as if the infection was ſwallowed with *the ſaliva*, and thus operated as a purge.

Mr. Van Eems ‡ informs us, that if the abdomen of an animal that has lain ſome time under water after drowning, ſuddenly burſt, a moſt active and penetrating fluid proceeds from it, very injurious to the eyes, lungs, and ſtomach; and inſtantly deſtructive to the appetite, inſomuch as to provoke nauſea, vomiting, and even to bring on dyſentery.

2. Another mode in which the diſeaſes dependent on thoſe cauſes may be produced, is *by*

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* See page 23.

† On the Remitting Bilious Fever of Philadelphia, 1793, p. 107.

‡ Prælection. Boerhaav. 248.

the diſorganizing proceſs, which the ingeſta take on, in the ſtomach and bowels themſelves.

The human conſtitution derives its principal ſupport from foreign materials, received into the digeſtive organs: and the due performance of this neceſſary function is therefore indiſpenſably requiſite to the healthy condition of our bodies: this ſtate is preſerved by the influence of the gaſtric liquor and ſaliva in the ſtomach, and by the pancreatic and bilious juices in the ſmall inteſtines; but theſe healthy ſecretions are again dependent on the vigour of the organs of digeſtion, which is increaſed or diminiſhed by the matters taken into them. Theſe ſubſtances are derived from the animal and vegetable kingdoms, and in healthy digeſtion, they will ſuſtain and nouriſh our ſyſtems.

But in caſes of the prevalence of epidemic, and other like diſeaſes, while the prediſpoſing cauſes exiſt, it would be to be inferred, from our principle, that fleſh-eaters, in an eſpecial degree, ſhould be liable to an attack of thoſe diſeaſes; for, from the analyſis of the lean muſcular fibre, we are enabled to underſtand whence may flow the ſepton, for the formation of the deleterious cauſe; and by the occaſional uſe of vegetable ſubſtances, as well as from the animal matter itſelf; the other ingredient, oxygene, is afforded. A conſequence is, that thoſe ſubſtances which are deficient in either of the component ingredients, are thoſe of the moſt ſalutary uſe in ſuch caſes: ſubſtances of this nature are the fat of animals, oil, butter, &c. which are known not to contain the ſeptous or putrefying baſe, and may therefore be had recourſe to as food, with the moſt perfect ſafety; or, on the other hand, vegetables, as affording leſs ſepton than lean meats, and ſome of them ſcarcely any, may be uſed with like freedom. And it is unqueſtionably owing to this mode of living, that Frenchmen are, comparatively, in ſo ſmall a degree ſufferers from theſe forms of peſtilential ailment, in unhealthy countries and climates; whoſe habits of life are ſuch as to draw by far the greater part of their nouriſhment from vegetable ſubſtances. To this effect, Jackſon* obſerves, that "the French and Spaniards eat leſs animal food, and drink their liquors greatly more diluted, than the natives of England: they eſcape better from dangerous diſeaſes, and this has been remarked to bear ſome proportion to the degree of abſtemiouſneſs they obſerve." Mr. Verdoni declares, that "the Greek chriſtians in Smyrna, during the ſeaſon in lent, when they eat only vegetables, are very ſeldom attacked by the plague, while among thoſe who eat fleſh the contagion makes great havoc. Thence the beſt means of prevention are to eat moderately, and not at all of animal food," &c.

In infected ſituations, thoſe cauſes which tend to the debility of the digeſtive organs will contribute very much to the production of diſeaſe. Of this kind are the habitual uſe of too much ardent ſpirits, and other habits of intemperance; expoſure to exceſſive heat, and other violent exciting powers, which, by their operation, induce an indirect debility of theſe organs; or the operation of fear, terror, and the like, may induce a ſimilar operation, by an abſtraction of the uſual neceſſary ſtimulation. Theſe favour the unhealthy diſorganiſation of the ingeſta, by withholding the antiſeptic powers of digeſtion and concoction, depending upon a healthy ſtate of the gaſtric ſecretion. When, by the operation of the above-mentioned noxious cauſes, this unhealthy and debilitated condition is induced, it is evidenced to us by tenſion, oppreſſion, and belching; and ſtill further, by the acid, putrid, and peſtilential nature of the matters vomited from the ſtomach.

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* Fevers of Jamaica, p. 395.

That an acid is vomited up in caſes of this nature is aſcertained by the ſour taſte, and by the eroſion of the calcareous enamel of the teeth, in ſome inſtances. "I have," ſays Hunter *, "ſeen an inſtance of fever, in which it was neceſſary to give from half an ounce to ſix drachms of the powder of oyſter-ſhells, to deſtroy the acid that was generated in the courſe of the day, which otherwiſe occaſioned great pains and reachings." The green colour of the bile is known to depend upon an acid in the ſtomach; for we know by experiment, that the moſt healthy bile, whoſe colour is yellowiſh, will be changed to green by mixture, in certain circumſtances, with an acid.

What the nature of this acid is may be collected from the account given by Wallis †, of a porraceous and black bile often ſeen thrown up by vomiting, which corroded metals, and boiled up on the ground like ſpirit of vitriol dropped thereon; and ſo auſterely acid, that it ſet the teeth ſtrongly on edge, and excoriated the throat. It is further related, that a man who had vomited up a large quantity of green, black, and acid bile, being agitated by convulſions, had a ſilver ſpoon put into his mouth, that he might not bite his tongue, and

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* Obſervations on the Diſeaſes of the Army in Jamaica, p. 161.

† Edition of Sydenham, vol. ii. p. 191.

in a moment it turned black, as if it had been ſtained with ſpirits of nitre; but the man had drank liquors ſoured with lemon-juice.

The coffee-coloured matter, commonly called the *black vomit*, which is ejected from the ſtomach in violent remitting fevers and plague, is to be conſidered as bile, impregnated with the more active ſeptous combinations, as appears from its corroſive nature, noticed by diſſectors in theſe diſeaſes; or yet, in other caſes, there is an admixture of blood, while by its own cauſtic nature the ſeptous acid thus formed in the ſtomach had eroded the extreme blood-veſſels of that viſcus. Hillary * witneſſed the exiſtence of theſe appearances in the remitting fevers of Barbadoes, and obſerves, that "great quantities of black, half-baked, or half-mortified blood, are frequently voided, both by vomiting and ſtool; with great quantities of yellow and blackiſh putrid bile, by the ſame ways."

When, therefore, there exiſt ſuch fluids in the ſtomach, the occurrence of nauſea, exceſſive vomiting, painful burning of the ſtomach, and other ſymptoms of Gaſtritis, we ſhould ſcarcely doubt, from the nature of theſe ſeptous combinations, that on diſſection, the various phænomena of inflammation would manifeſt themſelves.

Conformably we find, according to the diſſections of Drs. Phyſick and Cathrall, that in the diſeaſe of Philadelphia, in 1793, "*the ſtomach and beginning of the duodenum are the parts that appear moſt diſeaſed.* In two perſons who died of the diſeaſe on the fifth day, the villous membrane of the ſtomach, eſpecially about its ſmaller end, was found highly inflamed; and this inflammation extended through the pylorus into the duodenum ſome way. The inflammation here was exactly ſimilar to that induced in the ſtomach by acrid poiſons; as by arſenic, which we have once had an opportunity of ſeeing in a perſon deſtroyed by it.

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* Diſeaſes of Barbadoes, p. 151.

"The bile in the gall-bladder was quite of its natural colour, though very viſcid.

"In another perſon who died on the eighth day of the diſeaſe, ſeveral ſpots of extravaſation were diſcovered between the membranes, particularly about the ſmaller end of the ſtomach, the inflammation of which had conſiderably abated. Pus was ſeen in the beginning of the duodenum; and the villous membrane at this part was thickened.

"In two other perſons, who died at a more advanced period of the diſeaſe, the ſtomach appeared ſpotted in many places, with extravaſations; and the inflammation diſappeared. It contained, as did alſo the inteſtines, a black liquor, which had been vomited and purged before death. This black liquor appears clearly to be an altered ſecretion from the liver; for a fluid, in all reſpects of the ſame qualities, was found in the gall bladder. This liquor was ſo acrid, that it induced conſiderable inflammation and ſwelling on the operator's hands, which remained ſome days. The villous membrane of the inteſtines in theſe laſt two bodies was found inflamed in ſeveral places."

And in a letter addreſſed to Dr. Duffield, of Philadelphia, from Profeſſor Smith, we extract the following appearances on diſſection, on one who died of our epidemic in 1795; "*The ſtomach and duodenum*

denum exhibited marks of high inflammation; the liver little altered from its natural appearance; the gall-bladder abſolutely empty; the lower inteſtines quite ſound, the lungs alſo; and the brain, except in being rather of a darker ſhade than is uſual."

From theſe diſſections it appears, that the ſuperior portion of the inteſtinal tract is the part which more particularly ſuffers the operation of theſe cauſes of diſeaſe. And hence we are led to an inquiry into the cauſes which may account for this partial operation. From the nature of theſe ſeptous combinations, which are ſuppoſed to be the offending cauſes in theſe ſituations, we are naturally led to inquire into the component ingredients of the bile, which is here emptied into the inteſtines, in order to aſcertain if there do not exiſt in it ſome ſubſtance, for which the principle of putrefaction has a greater attraction than for the viſcera themſelves.

From the ſucceeding experiment of Saunders *, we analogically conclude, that ſuch a ſubſtance does exiſt in the biliary ſecretion of the human ſpecies; as there is probably no very material difference in us from other animals, in this ſecreted liquor.

" A quantity of (*ox*) bile and diluted marine acid were put into a flaſk, and placed in a ſand-bath, until they had acquired the boiling heat. On inſpection, the ſeparation into parts was very evident; and on committing it to the filter, it ſeparated a colourleſs fluid, deſtitute of every bilious property. The *reſiduum* conſiſted of a very dark green maſs, intenſely bitter, and extremely glutinous. When examined, it appeared to be compoſed of an animal mucilage, in combination with a reſinous ſubſtance.

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* Treatiſe on the Liver, p. 103. London, 1793.

“ But to aſcertain in what way the acid had effected the decompoſition, it became neceſſary to examine the filtrated liquor. It was therefore ſubjected to a cautious evaporation, and at a proper period was ſuffered to cool.

“ Under cooling, chryſtals were formed of a cubic figure, which decripitated by heat, and poſſeſſed all the characters of common ſalt.

“ Therefore the decompoſition was here occaſioned by the marine acid engaging the *mineral alkali*, which it ſeparated from the other elements of the ſaponaceous body, and, by uniting with that *baſis*, formed common ſalt.”

Since then there is exiſting in our inteſtines this bilious ſecretion, whoſe alkaline nature we have thus ſeen experimentally aſcertained, it will appear manifeſt, from the known attraction between the acid of the ſtomach and the ſoda of the bile, in what manner there ſhall take place a union of the ſeptous acid with the biliary alkali, and thus a conſiderable part, or in ſome caſes even the whole of the ſeptous acid, being thus neutralized or ſaturated, that part of the duodenum below the opening of the ductus communis choledocus, together with the jejunum and ilium, in moſt inſtances, be unmoleſted by its inflammatory and cauſtic nature. Theſe facts lead to a ſatisfactory ſolution of the phænomena of the extraordinary ſecretion of the bilious matter in thoſe diſeaſes; ſince it appears, from the preceding conſiderations, to be one of the reſources of Nature, in counteracting this offending cauſe.

Or, if it ſhould not meet with a ſubſtance to neutralize it wholly, or nearly ſo, it may paſs on, and by the operation of the abſorbent veſſels, by being taken up and carried the round of the circulating fluids, be eventually manifeſted by imparting to the ſkin a yellow or other like ſuffuſion: this explication of the tinge of the ſkin, in certain inſtances, is rendered probable, by the relation of a caſe of diſeaſe laſt ſummer, from undoubted authority, in which the following ſtriking fact preſented itſelf: A patient labouring under the epidemic, whoſe ſkin was of a remarkably yellow colour, was ordered an epiſpatic; on dreſſing the bliſter, after its operation had ceaſed, the ſciſſars which were made uſe of to remove the ſcarf ſkin, were accidentally left moiſtened with the ſerum for about a quarter of an hour, when, on examining them, the obſerver was aſtoniſhed to find they were oxydated as if dipped into a ſtrong mineral acid.

And Van Swieten, in the plague of Oczakow, relates, that "the inſtruments which the ſurgeons made uſe of were turned as black and livid as if they had been dipped in aqua fortis."

On the Cuticular Surface.

How the Skin of Perſons, living in an Atmoſphere thus vitiated, is affected, and how it operates on Wounds.

On the application of the cauſes of diſeaſe which we have been conſidering, do we preſume, are to be explained various efflorescences and eruptions occaſionally beſetting the external ſurface of our bodies. Theſe appearances will be different, according to the concentrated or ſparſe form in which the cauſes are applied, and to the duration of their continuance; and in this way partly is to be explained the peculiar tinges of the countenance in tropical climates, even although there ſhall not be preſent actual diſeaſe. And on the like principle, is explicable the abſence of the different ſuffuſions in contagious diſeaſes, till ſome progreſs has been made in the morbid action.

To this mode of operation are probably referable the different kinds of eruptions which have been hitherto conſidered as critical depoſitions of humours from the body. From the greater ſpecific gravity of the contagious fluids, the lower parts of the body, which are moſt conſtantly expoſed to its operation, are firſt affected, and worſe afflicted, than other parts of the conſtitution. Thus the legs of perſons ſick on ſhip-board, are often miſerably ulcerated. Sometimes, in very unhealthy countries, an uneaſy itching in the legs has been the firſt ſymptom of diſeaſe; and upon pulling down the ſtockings, ſtreams of thin diſſolved blood followed; ſoon after which a ghaſtly yellowneſs invaded the whole body, and the patient has died in leſs than forty-eight hours.

In 1764, the quality of the air at Batavia, which then exhibited a mingled ſcene of diſeaſe and death, was ſo malignant, that a ſlight cut of the ſkin, a ſcratch of a nail, or the moſt trifling wound, &c. generated quickly into a putrid ſpreading ulcer, which in twenty-four hours conſumed the fleſh even to the bone, as was experienced by the Britiſh frigates Medway and Panther, then lying there. From its diſpoſition to adhere to bedding and cloathing, there can be no difficulty in underſtanding how miliary and petechial ſpots are produced, in many inſtances beginning about the back, loins, and inſide of the thighs of thoſe who are expoſed, and extending thence over the covered parts of the body, in thoſe who are ſweating in their own vapours and exhalations in bed: they have thus a contaminated atmoſphere around them; and from its operation upon the ſick, do theſe morbid appearances of the ſkin proceed. The occurrence of theſe ſorts of fevers in low, foul, and dirty dwellings, &c. may thus be referred to the noxious air the patients live in, and to the infected beds they lie upon.

In the iſland of Jamaica * ſores are very frequent and troubleſome on the lower extremities. A trifling ſcratch, bruiſe, or hurt on the feet and legs, ſoon became a deep and ſpreading ulcer, which was always difficult, and ſometimes impoſſible to be healed. Little injuries of theſe parts are very apt to ſpread rapidly, and form a large ulcerated ſurface. Granulations are hard to form, and, when formed, frequently become flaccid and mortify, the portion ſkinned over ulcerates afreſh, and the ſore becomes larger than ever. The bones are apt to become carious, the patient to grow hectic, and linger on to death. Freſh vegetable diet, full nouriſhing diet, calomel in ſmaller doſes, to operate as an alterative, external application of almoſt all ſorts of poultices, ointment, dry lint, &c. and a horizontal poſture of the limbs, were ſo ineffectual, that Hunter relates it as the general reſult of all his experience, that ulcers of ſome ſtanding, and of conſiderable ſize, in the lower extremities, cannot be healed in that country, by any means we are acquainted with. Yet theſe very patients, ſent away from the iſland to Europe, had their ulcers frequently healed on the paſſage; the reſt, except in caſes of carious bones, ſoon recovered. Ampu-

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* Hunter on the Diſeaſes of the Army in Jamaica, p. 227.

tation in theſe other caſes anſwered in England, but ſucceeded very badly in Jamaica.

Cleghorn * teſtifies to the analogy between Rome and Minorca, in reſpect to the troubleſome nature of ulcers, on the inferior extremities. "Baglivi tells us, that at Rome ulcers of the legs are almoſt incurable, and wounds in them difficult to heal, while the like accidents on the head are quickly cured without any trouble. The ſame thing happens here, inſomuch that it is a proverb among the natives, "Minorca is good for the head, but bad for the ſhins."

Van Helmont † ſaw a man, who, upon touching ſome papers infected by the plague, felt inſtantly a pain, like the prick of a needle; a peſtilential carbuncle made its appearance ſoon after on his fore finger, and he died in two days.

Van Swieten ‡ relates, that a man, who ſtirred up with his foot the ſtraw whereon the bed of one ſick of the plague had been laid, "a little while after felt an acute pain in the lower part of his leg, juſt above the foot, as if the part had been ſcalded with boiling water; the next day the epidermis, or ſcarf-ſkin, was elevated into a large bliſter, upon breaking which a quantity of blackiſh liquor run out, and underneath a latent peſtilential carbuncle was diſcovered."

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* Diſeaſes of Minorca, p. 78. † Tum. Peſt. p. 853.
‡ Sect. 1409.

On the Lymphatic and Glandular Syſtems.

How the above-mentioned Compounds operate upon the abſorbent Veſſels, and the Glands of the Body.

On theſe parts of our ſyſtems we are preſented with the phænomena occaſionally attendant on diſſections of dead bodies, from the peculiar gas thence ariſing, and of which an account is given by Mr. St. John *. "I have known a gentleman, who, by ſlightly touching the inteſtines of the human body, beginning to liberate this corroſive gas, was affected with a violent inflammation, which in a very ſhort ſpace of time extended up almoſt the entire of his arm, producing an extenſive ulcer of the moſt foul and frightful appearance, which continued for ſeveral months, and reduced him to a miſerable ſtate of emaciation," &c.

A ſimilar occurrence took place at the New-York Hoſpital, ſome months ſince, to two young gentlemen engaged in ſewing up the abdomen of a patient who had been examined by the phyſicians and ſurgeons of that inſtitution; each of them pricked one of his fingers in the operation: in a few hours afterwards, the part pricked in both theſe inſtances became painful and ſwelled; the inflammation extended itſelf along the arm, till it reached the axillary gland, on which it produced violent inflammatory action, which was of ſome conſiderable continuance. In one of theſe caſes, the lymphatic veſſels were ſo highly inflamed as to become viſible in the courſe of their diſtributions along the arm.

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* Preface to Method Chem. Nomenclature, p. 111.

Ruſh † notices like affections of this ſet of veſſels, in the Philadelphia epidemic of 1793. "I met with three caſes of ſwellings in the inguinal, two in the parotid, and one in the cervical glands." And the epidemic of our own city in 1795 afforded ſome few inſtances of this ſort.

The appearance of buboes in the plague, as remarked by every writer on that ſubject, may be taken as the operation of theſe cauſes on theſe parts of our conſtitution.

Nor are the brute animals exempted from the influence of theſe ſtimulating powers when applied to their œconomy. For *cats* and *dogs* have been known to ſuffer by the appearance of buboes, &c. as related by the writers on plague, and other like maladies.

A new Theory of Fever.

FROM the operation of theſe combinations, the learned Profeſſor of Chemiſtry has deduced a new doctrine of fever. Judging from their effects, peſtilential fluids appear to be always, even in their weakeſt form, ſomewhat of ſtimulants. In many inſtances, they are moſt violently ſo. Though their operation is modified in a very peculiar manner, when in a dilute form they impede reſpiration, or nauſeate the ſtomach, as they then bring on a diminution of action and energy, amounting in the cold ſtage to a ſtate of direct debility: when applied in great quantity and force, they kill inſtantly; when in leſs quantity, they produce an anomalous diſeaſe, of the form of which Chiſholm's caſes preſent us with inſtances; when in a weaker ſtate, a common contagious catarrhal affection may be the conſequence; when inhaled in a form yet more diluted, a remitting or intermitting fever may be the diſeaſe induced, of the form of quotidian, tertian, or quartan, or any of their varieties; or the remitting may be called jail, hoſpital, ſhip, camp, army, yellow, putrid, or bilious, malignant, peſtilential, miliary, petechial, ardent, ſlow, continued, continual, dyſenteric, contagious, or infectious, according to the circumſtances that may occur in the progreſs of the diſeaſe.

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† Page 68.

" The main difficulty left is to account for the cold fit of a regular tertian. This ſtage of fever I believe to depend upon impeded reſpiration; and the impeded reſpiration to depend upon the vitiated quality of the air, taken into the lungs; or in ſome ſlighter caſes, where the ſtomach is originally thrown into a diſordered ſtate, the lungs, by aſſociation with that organ, are thrown into diſorder too, and for a time perform their functions but imperfectly.

" Thus I preſume it is, that the impeded ſtate of reſpiration is attended with a ſmaller evolution of heat and oxygene in the lungs; and conſequently with more or leſs diminution in the circulation of the blood, and a proportionable degree of chillineſs and coldneſs throughout the body. The duration and degree of the cold fit will correſpond to the continuance and power of the cauſes diſturbing the pulmonic organs, either by acting upon them directly or indirectly, through the intermedium of the ſtomach.

"From the ſmall quantity of heat and oxygene communicated to the blood in the lungs, and the conſequent ſlow and feeble circulation of the blood, can the ſhrinking, paleneſs, tremors, coldneſs, debility, &c. &c. be ſufficiently explained, as the conſtitution is now deprived of its two chief ſtimulants.

"But why does not the continued operation of the vitiated air upon the lungs, or the aſſociated condition of the lungs with the ſtomach, go on in an increaſing ſeries even unto death? The power of our conſtitutions to become familiarized to the action of noxious cauſes, is evinced by the innocent operation of poiſonous ſubſtances, which, by frequent repetition, grow gradually habitual, and by cuſtom, loſe their primary operation. This diſpoſition to become familiarized to vitiated airs, is apparent in the inhabitants of Africa, who are ſo ſeaſoned to the air and climate they live in, that it excites no diſturbance at all in their conſtitutions, while ſtrangers fall victims in the greateſt abundance. Now, common intermitting paroxyſms, are inſtances of temporary ſeaſonings, which the conſtitution experiences, of a kind quite analogous to what is perpetual with the Guinea negroes.

"The cold fit ſometimes does terminate in death; and this happens when the conſtitution cannot acquire the habit of enduring the noxious cauſe with impunity. In the generality of caſes, however, the ſtimulus of the infectious gas loſes its power to operate before the conſtitution is debilitated to death; and as ſoon as it becomes, for this time, ſo much accuſtomed to the vitiated air, as no longer to be diſturbed by its preſence, the cold fit ends. The length and violence of the cold fit will thus be *cæteris paribus*, in a compound ratio of the impediment given to the reſpiration by the infectious gas, and the facility with which the conſtitution accommodates itſelf to its action; if three perſons then inhabit one houſe, it is poſſible that one may become ſo quickly accuſtomed to the air, as to have no diſtemper; a ſecond may have a moderate diſeaſe of but a few fits; while the third, poſſeſſed of a conſtitution not eaſily moulded to a new habit, may be incommoded by a violent and obſtinate malady.

" In every paroxyſm of an intermittent, the infection thus wears itſelf out; but this is only a temporary reconcilement of the body to its action; when, after a repetition of fits, the diſorder becomes milder and milder, and after a while wholly ceaſes. This is a caſe of laſting reconcilement; and in this way may a large portion of ſmall intermittents cure themſelves, while the credit is given to the bark! This power of habit daily does wonders, and labours more effectually for the good of the ſick than bark, opium, and antimony put together.

" The attack of theſe cauſes being thus for a time overcome, reſpiration grows free, full, and frequent; becauſe there is now a greater appetency in the conſtitution for heat; more vital air is decompounded in the lungs, and more ſtimulus is applied by means of the increaſed heat and oxygene now in the blood, to the heart and arteries; theſe ſtimuli operate more powerfully on account of the accumulated excitability of the body; and a degree of excitement is thence induced which ſometimes ends in death, ſometimes cauſes delirium, and in almoſt every caſe exceeds the healthy temperature.

" The duration and violence of the hot ſtage, will be *cæteris paribus*, in a compound ratio of the excitability accumulated in the cold ſtage, and the heat and oxygene evolved in the hot one. When the excitability is exhauſted by the operation of the ſtimuli, the violence of action will ceaſe, and the body grow cool.

" The doctrine of intermitting fever then, is briefly this: the vitiated atmoſpheric fluid, by interfering with the pulmonic action, brings on the cold ſtage, and would continue the ſame until its termination in death, did not the conſtitution, in the mean time, acquire ſuch a habit as to gain a temporary inſenſibility to its action. This habit being induced, the cold ſtage abates by reaſon of the ſtate of direct debility into which the body had been brought; anxiety continues, and by the quickening of reſpiration, heat and oxygene are ſet looſe in the lungs, and becoming incorporated with the blood, now warm, and ſtimulate every part with more than uſual power, and occaſion the phænomena of the hot ſtage, which terminates as ſoon as the accumulated excitability of the ſyſtem is exhauſted. The ſweating ſtage follows of courſe, as in other caſes of the ſubſidence of violent action: for after a time, the exhauſted excitability of the animal ſyſtem, allows exceſſive action to go on no longer; the reſpiration grows more moderate and eaſy; the heart beats with leſs frequency and force; the arterial contractions are alſo more ſlow and health-like; and, as the arterial contractions relax, the hydrogene and oxygene of the blood now run together in the extreme veſſels of the ſkin, and form the moiſture which bedews the ſurface, and this afterwards flying off by evaporation, cools by degrees the whole body down to its ordinary temperature: and, as the arterial extremities of the reſt of the body become dilated by the ſubſidence of excitement, the other ſecretions, which had been generally ſuſpended during the fit, now return as before: after this, the conſtitution, ſo far accuſtomed to the breathing ſuch an atmoſphere, regains its former vigour and functions, as far as the exerciſe induced and functions injured during the ſeveral ſtages will allow.

"The interval between one fit and the ſucceeding one, will be proportionate to the duration of the habit of reſiſtance acquired. Some perſons thus experience but one fit, and all is over; for, under the ſame circumſtances they are never invaded by a ſecond. Others ſuffer two fits, or a ſucceſſion of fits, and, after a while become ſo accuſtomed to the ſtimulus, that, if always applied in the ſame degree of ſtrength, its effect is no longer felt upon the body; in other inſtances again, ſo hard is it for the conſtitution to be moulded into a ſettled habit of oppoſition, that after enduring a great number of invaſions, it becomes at length enervated and worn down, ſo much as finally to die exhauſted.

"The ſpecies of fever, whether quotidian, tertian, &c. will depend upon the readineſs or quickneſs wherewith the offending cauſe gains a new aſcendency over the body, or breaks the habit. And to the mobility of the body, or eaſe with which the habit is broken, is to be aſcribed, as well the frequency of the returns, as the duration and ſeverity of the paroxyſms.

"The anomalous caſes of fever, which have puzzled phyſicians to explain, and noſologiſts to arrange, are thus very naturally accounted for; ſince, according to the variation of the cauſe, as the noxious atmoſphere may thicken or diſperſe, will be the variety in the effect produced; and, as there may be infinite gradations of the deliterious cauſe, there may be endleſs varieties in the morbid effect.

"And to this principle of the human conſtitution, I believe, may be referred all the febrile ailments from the moſt trifling intermittent to the more ſerious remittent, and the ſolemn form of continued fever.

"Hence further may it be underſtood, how a ſucceſſion of fits, long continued, may diſpoſe the conſtitution to a repetition of fits, even when the morbid cauſe is away; for though there may be a habit of inſenſibility produced to the vitiated airs, yet a habit may in the meanwhile be eſtabliſhed in the bodily motions of falling periodically into regular trains of action, even when the original cauſe is withheld. Here then will be produced a habit of having paroxyſms depending on the particular inward ſtate of the moving fibres, after the manner of temporary ſeaſonings; while, at the ſame time, there is a habit formed of reſiſting the active cauſes (vitiated air) altogether, or of obtaining a permanent ſeaſoning as to them.

"The cold ſtage of a paroxyſm is a ſtate of direct debility, induced by the vitiated air breathed operating to ſubduct heat and oxygene from the body; and its termination is by the ſtimulus of the vitiated air being for that time worn out. The hot ſtage, which begins as ſoon as the temporary ſeaſoning is induced, is a ſtate of excitement brought on by the heat and oxygene now operating upon the accumulated excitability with additional force. The ſweating ſtage is formed after the ſubſidence of the exceſſive action of the body, and the conſequent enlargement of the diameters of the veſſels, whereby ſweat is formed by the combination of hydrogene and oxygene, and the other ſecretions proceed again, as uſual, in the ſeveral glands.

"The length of interval between the paroxyſms depends upon the ſtrength of habit acquired.

"The frequency of their occurrence will be proportioned to the facility with which a temporary habit is broken or gives way.

"The cold ſtage is the moſt dangerous; and perſons dying in it die of the direct debility induced by the vitiated atmoſphere they reſpire.

"The hot ſtage is leſs dangerous; and perſons who die in it expire in a ſtate of indirect debility. But, according to circumſtances, death may happen in both the cold and hot ſtages.

"The ſweating ſtage is a mere conſequence of the cooling of the body, after the preceding heat and excitement of it."

The ſimplicity of this theory, when put in competition with the complex doctrines of preceding phyſicians, at the ſame time that it cauſes our aſtoniſhment at their divergency from the fundamental laws of Nature, flatters our judgment with its own approximation; and as it does not take the mind into the fancied reaſonings of ſpeculative hypotheſis, neither does it deprive it of ſatisfactory reflections on facts and nature. The powers of habit and cuſtom, though hitherto acquieſced in, in almoſt every action of life, have not as yet been ſufficiently conſidered in their relation to febrile phænomena. Hence have the moſt uſeleſs remedies been brought into eſtimation, and acquired a reputation to which they had no juſt pretenſions; the diſorder abated as ſoon as the conſtitution had become habituated to the new ſtimulus, and not becauſe ſpecifics were adminiſtered.

ſtered. Hence, though blood be drawn off to the amount of upwards of an hundred ounces, or calomel adminiſtered to the extent of ſixteen hundred grains in the courſe of one febrile indiſpoſition, the patient may get well in ſpite of both, as ſoon as the habit of reſiſtance is formed.

On the Manner in which the Materials of Dwelling-Houſes are affected by Septous Fumes and Combinations. In a Letter from Dr. SAMUEL L. MITCHILL, *to Dr.* EDWARD MILLER, *of Dover, Delaware.*

SIR,

SOME paragraphs and eſſays which have for ſome time paſt appeared in our newſpapers, and a number of queries propoſed to me by my private correſpondents, concerning the production of infectious air in houſes, and its concealment in ſundry ſubſtances, of which the habitations of men are conſtructed, have determined me to collect ſuch facts as occurred to me on that ſubject, and make them the matter of a letter to you. Your very obliging and friendly favour, dated at Dover, the 15th of November, merited a more ſpeedy anſwer; but I am confident you will pardon my tardineſs, when you conſider that I have of late, like yourſelf, been engaged in an inquiry, tending to alleviate ſome of the inconveniences which reſult from our mode of living, eſpecially in large and populous cities.

And here I ſhall take it for granted, as proved in my treatiſe on contagion and elſewhere, that the air of houſes, tenements, and dwelling-places, is vitiated occaſionally in a very alarming and deleterious degree by the gaſeous oxyd or volatilized acid produced by animal and vegetable decompoſition, which have been denominated the *nitrous*. I have for ſome time been of opinion, that an examination of the facts upon this point is an important deſideratum, both in philoſophy and houſekeeping.

The materials of houſes may be claſſed under three general heads, as they conſiſt, 1ſt, of Earth; 2d, of Wood; and 3d, of Paper.

1. The *earthy* materials of human habitations, whether of ſtone, brick, or plaſter, may be conſidered as conſiſting in the main of flint, clay, and lime, the greater part of them being capable of reſolution by analyſis, into one or more of theſe elements. The flinty parts of a building, comprehending the ſtone and the ſand mingled with the mortar, are from their nature not capable of uniting, in ordinary temperatures, with any of the common acids in any of their forms, and therefore remain pretty much in their original ſtate as long as the houſe ſtands.

But the caſe is far different with the lime and clay. The operation of burning lime-ſtone, to render it fit for the purpoſes of maſonry, is principally to deprive it of the carbonic acid (fixed air), with which, in its natural and crude ſtate, it had been united. And this kind of air is ſo abundant in the atmoſphere, that as ſoon as the calcined material, now converted to quicklime, is taken from the kiln, it begins to recombine in a ſlow and gradual progreſs with the fixed air, which had been expelled by the fire, and returns to the ſtate of mild lime. In this condition, of greater or leſs combination with its original acid, it is worked up into mortar, and employed as a cement. And after its application to the purpoſes of brickwork or walls, lime may be conſidered as attracting its loſt fixed air as faſt as circumſtances will permit; and this proceſs may go on until a greater part of the lime is ſaturated. In this ſituation the walls may remain an indefinite duration of time, until the fixed air be expelled by ſome ſubſtance having a ſtronger attraction for lime than itſelf.

The habitations of men are known to afford ſuch a ſubſtance; and the ſeptous (nitrous) exhalations extricated in rooms, are found to diſplace the carbonic acid by virtue of a ſtronger attraction for lime, and attach themſelves to that calcareous baſis in the form of a nitrate of lime. There are ſeveral ſubſtances, ſuch as the acids of ſugar and of ſulphur, which have a ſtronger affinity to lime than the nitrous acid has; but theſe rarely occur to diſturb the common proceſs. The plaſter then by degrees becomes charged with the acid of ſaltpetre, attracted from the air of the chamber. This operation may go on in an old and foul houſe, until the whole of the lime is ſaturated with the ſeptous vapour, and can take up no more.

Theſe noxious exhalations being now no longer attracted by the lime, muſt either circulate through the houſe, or combine with ſome ſubſtance capable of fixing them. The *clay* of the walls is a baſis with which they are diſpoſed in the next place to join themſelves. The nitrous acid, in the abſence of the ſulphuric (vitrolic), has the ſtrongeſt attraction for clay, of any; and the combination of theſe two ſubſtances may thus go on as long as any particles of clay retain a capacity to attract the acid.

In the progreſſion of things, the clay and the lime become loaded with as much ſeptous acid as they can poſſibly abſorb; and after this the peſtilential gas, finding no other material to form a chemical union with, will be accumulated and diffuſed through the room or houſe, penetrating the interſtices of bibulous and porous ſubſtances.

A faſhion prevails in our newly-conſtructed and elegant houſes, of making the walls of *gypſum* or plaſter of Paris. This ſubſtance is a compound of lime with the ſulphuric (vitriolic) acid. The ſulphuric acid, as was mentioned before, poſſeſſing a ſtronger attraction for its calcareous baſis than the nitrous poſſeſſes, cannot be altered or diſlodged by the ſeptic vapours circulating in the rooms. The lime of ſuch walls will therefore remain for an indeterminate time, in their original condition; and the foul gaſes will immediately, and with greater readineſs than in the caſe of lime-walls, vitiate the air of the houſe.

Walls made of lime and clay may be thus viewed as preventives of infection, while thoſe conſtructed of gypſum have no ſuch ſalutary operation. The reaſon of the wholeſomeneſs of the former is, they are conſtantly taking the matter of contagion out of circulation, and fixing it in ſuch a manner as to render it quite harmleſs. As long as the walls preſerve their attractive powers, they render the air of a room fit for reſpiration in proportion to the quantity of gas they imbibe; when they ceaſe to attract any more of it, the air becomes leſs fit for animal life, by the ſurplus of gas unabſorbed.

To make houſes healthy then, the walls of ſuch as have ſtood a long time, and have become highly nitrous, ought to be broken down, and a freſh plaſtering of lime applied; or if this could not be conveniently done, a white-waſhing, which is only a thinner coat of plaſter, ſhould be frequently performed.

formed. The ſeptic fumes will then have ſomething to attach themſelves to, and be taken rapidly out of circulation. An eaſy experiment will determine whether the walls of houſes ſuſpected of being nitrous are really ſo or not. Take a quantity of the old plaſter, pound it, and ſteep it in water, and add ſome pot-aſh to the mixture; if the nitrous acid be there, it will quit its connection with the plaſter, and join the pot-aſh to form nitre.

The exiſtence of nitrous acid in old grave-yards, at the ſame time it points out the almoſt ſinful impropriety of burying the dead near the habitations of the living, directs us alſo to a remedy of the evil. If the coffin containing the corpſe was filled up with lime or pot-aſh, the danger of communicating infection at funerals, and the unwholeſomeneſs of burying-grounds, would in a great degree be obviated. In like manner, the addition of the ſame ſubſtances to the numerous privies of crowded ſettlements, would have a powerful effect in preventing the aſcent of deadly vapours into the air, or their penetration to ciſterns and wells of water through the air.

2. As to the timber which enters into the fabric of our houſes, whether it be oak, pine, cedar, mahogany, or of any other kind of wood, I know of no deciſive facts evincing a *chemical union* between it and putrid vapours. But as all theſe materials are conſiderably porous, there can be no doubt of their receiving into their interſtitial ſpaces a portion of the vapours which occupy the rooms. The quantity imbibed will probably be in proportion to their ſpungineſs or laxity of texture; and in this ratio may the different kinds of wood be imagined capable of penetration by foul ſteams. In moſt caſes of this kind, however, I apprehend

the contagious matter is in a very ſeparable ſtate, and ready on ſlight occaſions to manifeſt itſelf in its proper and diſtinct form. From the readineſs with which wood is penetrated by water, and from the known property of water to act as the vehicle to contagion, there can be no doubt of its entering pretty deeply into the timber of our dwellings, eſpecially thoſe that are not covered with a coat of paint. The covering the inſide work of houſes with paint, by occupying the pores of the wood, will exclude the entrance of peſtilential vapours, and thus far tend to their purity and wholeſomeneſs. It is ſaid that ſhips have ſometimes become ſo contagious, as to infect every ſucceſſive crew with which they were manned. This muſt, in all probability, have ariſen from the noxious matter inherent in their timber. And I ſuſpect the ſame thing frequently happens in many ordinary houſes inhabited by a ſucceſſion of dirty tenants. Wood, however, would ſeem to admit of eaſy cleaning. Clear water will go a good way towards purifying it. But the infectious matter may be, without doubt, extracted from it by careful waſhing with a ſolution of *potaſh* in water (common lye), or by white-waſhing with *lime*, or even *with clay*.

3. The paper with which houſes are adorned is a material of ſuch open and ſpongy ſtructure, that moſt fluids can eaſily enter into it. Oil and greaſe very readily inſinuate themſelves into paper. It very readily imbibes water, and in very conſiderable quantity too. Smoke tarniſhes it very quick. And the colours of ancient records and books are not wholly to be aſcribed to the decay of the paper and ink, but in part to the impregnation of the pages with foreign vapours. From theſe facts, ſhewing the readineſs and avidity with which paper

combines with moſt liquid and aeriform bodies, there can be little doubt of its poſſeſſing a capacity, like wood and other porous ſubſtances, to receive contagion among its filaments. But as paper poſſeſſes little or no *chemical* attraction for peſtilential vapours, they will not change their nature, or lay aſide their peculiar qualities, by entering into the interſtices of the paper, but remain in a very looſe ſort of connection, and exceedingly prone to detach themſelves and ſally forth into action. This idea is countenanced by the facts told concerning the catching of the plague by handling letters, which in theſe caſes were very probably damp, and by aid of moiſture, concentered more of the poiſon within them. Yet when I reflect that the bibulous or abſorbent quality of paper is the very cauſe why it is fit for receiving the ſtains, marks, ſpots, and colours which we impreſs upon it by writing and painting, it ſeems as if it might attach and retain a conſiderable ſhare of venom, even in its dry ſtate. Upon the whole, paper may be eſtimated as poſſeſſing all the inconvenience of wood, and in a much more conſiderable degree. Nor will this concluſion be invalidated by the conſideration that the paper is covered with paint, for this layer of pigment is not mixed in *oil*, as in the paints applied to wood, but it is generally *water-colour*, and therefore greatly more open and penetrable. Notwithſtanding theſe objections to paper, it may ſafely be employed in drawing-rooms and parlours without any ſenſible inconvenience or riſk, but bed-rooms and nurſeries, eſpecially in crowded families and infectious ſituations, had better be furniſhed with lime walls, and coated over with a calcarious white-waſh from time to time: when families are ſmall and ſituations neat and healthy, it is wholly immaterial in which way the chambers are finiſhed; but where the contrary is the caſe, it muſt be remembered that frequently changing the paper will ſcarcely prove a remedy of the inconvenience. On the ſubject of paper, an intereſting conſideration is, what danger there may be in receiving letters through the medium of the poſt-office, from infected places. That paper may receive and impart infection, I hold to be a ſettled fact: and I hold it to be no leſs a fact, that as there is no chemical connection between the one ſubſtance and the other, *heat alone will diſengage them.* If a letter, therefore, ſhould be received under circumſtances leading to a ſuſpicion of contagion, it ſhould be held as near the fire, with a tongs, as poſſible, without burning it, and continued till it be thoroughly heated. The gas will be rarified and volatilized by the heat, and will chiefly, if not entirely, quit its lurking-place in the paper, which may be unfolded and read with ſafety. With great regard and attachment, I remain, very unfeignedly, yours,

SAMUEL L. MITCHILL.

New York, Jan. 20, 1796.

DR. EDWARD MILLER.

On the Miſcibility of Contagious Air with Water. In a Letter from Dr. SAMUEL L. MITCHILL *to* JOHN STEVENS *Eſq.—Read before the Agricultural Society of the State of New York, February* 16, 1796.

DEAR SIR,

AFTER I had ſatisfied myſelf of the compoſition of that particular kind of air, which is produced from ſubſtances putrefying in places where *heat* and *moiſture* concur to form new combinations, my next object was to detect its particular qualities, and relations to other bodies: and I have become perſuaded that in all its forms, this oxyd or acid of ſepton, is *readily and entirely miſcible with water*. By water I do not mean the pure diſtilled fluid merely, but alſo the water of rain, ſnow, ponds, and marſhes; and occaſionally of the ocean, as well as the fluids which, though called by other names, do ſtill conſiſt chiefly of water, as vinegar, wine, ſpirits, &c.

Some of the intereſting conſiderations which ariſe from this chemical attraction between watry fluids and infectious air, I ſhall endeavour to ſtate to you in the order in which they riſe to my recollection, in anſwer to your polite and inſtructive letter, dated at Hobocken, September 25, 1795. In dependence upon this ſingle principle, a multitude of facts preſs upon the mind, and all appear equally eaſy of ſolution

1. It has been experienced in the neighbourhood of unhealthy landings, in the Eaſt and Weſt-Indies, that ſhips lying a ſmall diſtance off at anchor in the harbours, or at ſea, have in no degree

ſuffered by the noxious quality of the air, which was very injurious to the ſettlement on ſhore. But there, as well as on the coaſt of Africa, a boat's crew ſent on ſhore, and ſtaying the night, are very commonly ſeized with ſickneſs, which very commonly deſtroys a number of their lives. The reaſon of which ſeems to be, that the contagious air (ſeptous oxyd or acid) produced from putrefaction on the low and muddy banks of rivers, &c. is moſt concentrated at the place of its origin. Here, ſailors tarrying long aſhore, are obliged, in uncleared countries, to hut themſelves, and ſleep near the ground. From the greater accumulation of contagious air near the ſurface of the earth, they muſt be more particularly expoſed to its action while lying down than when ſitting up or walking about. By remaining for ſix or eight hours in this manner immerſed in ſuch an atmoſphere, and during the time of ſleep too, one may readily underſtand how they either ſicken on ſhore, or ſoon become unwell after getting on board. They ſuffer by its action in four ways: 1. By *landing* where the atmoſphere is vitiated. 2. By *lying near the ground* where the noxious gas is moſt condenſed. 3. By remaining *ſo long a time* within the ſphere of its operation. 4. By *going to ſleep*, that it may damage the body in that unguarded ſtate. In the vicinity of all this deſtructive air, the ſhips eſcape for two reaſons: 1. Becauſe, if the poiſonous air ſhould reach them, it would be in a rare and dilute form. 2. Becauſe in *paſſing over the water, ſo much of it would be abſorbed*, that a very thin ſtratum would remain on the ſurface, not many feet, or perhaps inches in height; ſo that little or no inconvenience could reſult from it. Hence the ſervice of cutting wood, getting water, burying the dead, trading excurſions, expoſure in open boats along coaſts, &c. are extremely hazardous in many hot climates.

2. The experiments made at Portſmouth, Cadiz, Sardinia, Penſacola, and in Guinea, have proved that ſhips anchored off a little diſtance from places where mortal ſickneſs rages on ſhore, afford a moſt convenient retreat for thoſe who are well, and allow an excellent chance of recovery to ſuch as are ſick. The ſecurity of ſuch places in unhealthy ſeaſons has led very naturally to the idea of recommending *floating factories* to the merchants who have trading eſtabliſhments on the ſickly coaſts of Africa, as at Cape-Coaſt-Caſtle, the mouths of the rivers Senegal, Gambia, &c. Mr. Dodge, a valetudinarian, who built *an ark*, as he called it, for himſelf and family, to avoid the influence of the ſickly ſeaſon on ſhore, has ſhewn by experiment, how well a private gentleman may be accommodated and enjoy his friends in a *floating manſion*, conſiſting of a ſleeping-room, dining-room, apartment for ſervants, kitchen, coal-room, wine-cellar, &c. The principle upon which ſuch places of abode are pronounced healthy is, that as the contagious fluid is produced aſhore, or from mud in the neighbourhood, a ſhip or *floating habitation* cannot commonly be affected by it, on *account of its attraction for water.* The ideas mentioned in your letter are therefore rational and juſt, "That in ſeaſons of infection temporary ſtages be framed of dock-logs, and anchored off the city, at a convenient diſtance from the wharfs. On theſe ſuitable apartments might be erected for the reception and accommodation of the ſick. And, in order to prevent, as much as poſſible, the accumulation of contagion, let the ſtages be multiplied as much as they conveniently can, and placed at proper

diſtances from each other. The moſt important benefits would probably reſult from an arrangement of this nature. By having a number of them, ſituated as they ſhould be, it would be very practicable to keep them free from contagion, as they might occaſionally be ſuffered to remain unoccupied long enough to cleanſe them properly. The ſick would be moved with the utmoſt eaſe and convenience, without the aggravation of their complaints by the jolting of a wheel carriage. The dead might inſtantly be diſpoſed of, and the danger of ſpreading contagion and panic-terror, by conveying dead bodies through the ſtreets in a hearſe, would be prevented. As the removal of a ſick perſon to an hoſpital of this kind would probably prove extremely ſalutary to himſelf, there would not be that reluctance either on the part of the ſick perſon or his friends, to this neceſſary meaſure; and thus the efforts of the police to ſeparate the ſick from the well, ſo far from meeting with oppoſition, would be aided and aſſiſted by every body. The opulent, no doubt, as a neceſſary precaution, would provide hoſpitals of this ſort at their own expence. Thus ſituated, every comfort, aid, and convenience, might be afforded the ſick, and their friends might attend them with ſcarcely any apprehenſion of danger. Theſe *aquatic lazarettos* might alſo be employed in another way, probably to great advantage. The air of the city, during the hot months, is extremely injurious to young children. Vaſt numbers are carried off every year, during the ſummer ſeaſon, by diſorders of the bowels. It is truly aſtoniſhing what an immediate effect a removal from the foul air of the city has on infants labouring under theſe complaints."

3. The remarks of almoſt all obſervers agree in this point, that the aërial vapours from ſtagnant water are ſeldom miſchievous, until evaporation has ſo far advanced as almoſt, or quite, to bear ſome part of the mud or bottom. The reaſon of this is evident. As long as evaporation goes briſkly on, the evaporating ſurface is kept cool, and putrefaction of courſe advances but ſlowly. The gas extricated below mingles with the incumbent water, and for ſome time little or none eſcapes to taint the atmoſphere. But as the quantity of water ſhrinks, and the ſwamp or pool dries up, the attraction of the atmoſphere for the water being ſtronger than that of the water for the contagion, the latter is diſcharged from its connection, and floats about at large: the mud now grows warmer, putrefaction advances, more infected air riſes, and there is leſs and leſs water to arreſt its aſcent: and thus the proceſs is carried on, until the want of ſufficient moiſture, to promote the chemical action of bodies, puts a ſtop to the work, and ſends forth all the gas into the atmoſphere. This explanation correſponds exactly with the facts relative to its operation upon human bodies, and the conſequent production of ſickneſs.

4. Rain falling briſkly in ſhowers is found to have a beneficial effect in ſeaſons of contagion. Some of the moſt infectious diſtempers we are acquainted with have happened in times of great drought. The ſuffering inhabitants of ſickly places have experienced ſenſible relief from ſhowers, and have generally relapſed when dry weather came on. To underſtand this, it may be proper to conſider the infectious fluid as having riſen ſome diſtance, more or leſs, above the ground, and the drops of rain paſſing through it as they fall. In a condition ſo favourable for union, the rain attracts the contagion,

tagion, and carries it down to the earth. The ſick are thereby relieved, and the healthy leſs expoſed to danger. By and by the water evaporates, and leaves the infectious fluid by itſelf, to riſe again, and contaminate the air. Mortality recommences. The natives of Africa are ſo ſenſible of ſomething unhealthy mixed at times with water, that though they generally bathe once a day, they never do it in the freſh river waters, when they are overflowed by the rains; but prefer ſpring-water, which flows pure from the interior parts of the earth. The *firſt* rains which fall in Guinea are ſuppoſed to be the moſt unhealthy; and as evidence of their being impregnated with ſomething more than common, they have been known to render the leather of ſhoes mouldy and rotten in forty-eight hours, and to ſtain clothes more than any other rain. Expoſure *to rain*, and *getting wet thereby*, are generally believed, ſays Hunter, to be productive of fevers in the iſland of Jamaica. I have heard fiſhermen remark, that expoſure and wetting in a ſhower of rain was more likely to make them ſick, than the regular attendance of their ſeines, up to the waiſt or arm-pits in ſalt water, day after day. There is one caſe, however, in which a fall of rain may be productive of ſickneſs. I ſhall give an example, as it occurs in Africa. During the drought, the wide rivers of that parched continent are ſhrunk to narrow ſtreams, and, retiring to their channels, leave bare a large part of the ſurface they uſually overflow. The moiſture ſoon exhales, and leaves behind it a thick and ſolid cruſt of dried mud. When the rains fall, they penetrate and ſoften this parched cruſt, ſoak into the ground below, and ſet the whole into a putrefying ſtate. From the ſurface, from which, during its dry condition, no vapours had riſen, now proceed noiſome and noxious exhalations, which produce the moſt violent ſickneſs.

5. Clothes wetted with water, and hung to windward, are the only known correctors of the violence of the *Harmattan* and *Samiel* winds. They may operate in two ways: 1. By mitigating the exceſſive heat of theſe blaſts by evaporation: 2. By attaching and fixing the peſtiferous matter they contain, or turning it aſide by reaſon of its inability to paſs through a coarſe wetted cloth. A great variety of charms and preventives are uſed againſt infection. None of the ſmelling-bottles, bags, &c. for the noſtrils, ſeem to be of any ſervice. If any thing of this kind, applied to the noſe and mouth, can do any good in peſtilential ſtates of the air, it is *a cloth or ſponge wetted with pure water*, or ſome watery fluid, which will allow the reſpirable air to paſs through or along it, and imbibe infection among the water inherent in the threads or pores. But ſuch a ſponge or cloth ſhould be often waſhed or changed, and never ſuffered to dry; otherwiſe the collected contagion, ſet looſe on the drying of the cloth, will be ſuddenly breathed in greater quantity than if no ſuch thing had been uſed. It is, therefore, very queſtionable, whether *even this application* would, upon the whole, be of any real utility.

6. Health has long ago been conſidered as greatly influenced by the quality of water. The ſaline, earthy, metallic, and, to a conſiderable extent, the *aërial* qualities poſſeſſed by this fluid have been a great way inveſtigated. From the readineſs of contagious gas to combine with water, there cannot remain a doubt of its being conveyed into the ſtomach in large quantities, together with our drink. Though this remark will only apply to the water ſwallowed cold; for all that which is taken

warm in teas, ſoups, &c. has been deprived of the peſtiferous air, by the operation of a boiling heat. It will be obſerved that I am now ſpeaking of fountain, ſpring, and well water, as employed for domeſtic uſes; and not of rain water, which certainly contains it. Freſh drawn water may be generally conſidered clear of it; but water that has ſtood long in an infected houſe may be conſidered very ſuſpicious at beſt. During the extenſive and mortal diſtemper which prevailed in the vicinity of the Salt Lake, the Seneka Lake, and on Geneſee, in the autumn of 1795, there was a remarkable connection between ſickly ſettlements and bad water. Where the water was good, few people were unwell. From the deſcription of the uniform ſhore of the Cheſapeak Bay, where ſprings of pure water are ſcarce, and where ſtagnant pools are filled with frog's ſpawns, muſquitoes, &c. it would ſeem that the foulneſs of the water entered largely into the remitting fevers of that region: and I think the ſame obſervation applies to other tracts of country, ſimilarly circumſtanced all the world over.

7. Spittle and the fluids of the mouth conſiſt chiefly of water, and therefore may be imagined to poſſeſs an attraction for ſeptic and contagious gaſes. The matter of infection thus getting into the mouth, will almoſt unavoidably find its way into the ſtomach with the ſpittle, in common ſwallowing, or during the deglutition of the food, or be conveyed thither with the drink. By this inlet many phyſicians have ſuppoſed contagion to be received into the body. The opinion is probably juſt. A gentleman of my acquaintance received the fumes of a dyſenteric evacuation; ſome uneaſineſs at the ſtomach came on, with qualmiſhneſs, which in a few hours ended in a looſeneſs. A

ſimilar indiſpoſition was brought on in another perſon, by receiving the effluvia at a funeral from a corrupting corpſe. In both theſe inſtances, it looks as if the infectious gas was ſwallowed with the ſpittle, and thus ſtimulated the inteſtines. Nor do the alleged experiments of ſwallowing without detriment the poiſons of ſmall-pox, the viper, &c. in very ſmall quantities, prove that *all other* combinations and modifications of contagion muſt be harmleſs. Theſe experiments, though true, are, however, no further true than reſpects theſe ſpecies of venom; and I own I ſhould like to ſee them repeated in larger doſes. Be this matter, however, as it may, one wholeſome inference reſults from the facts before us, that it is prudent to cleanſe the mouth of all ſpittle, to hawk the phlegm from the throat, and throw them out frequently, and to avoid ſwallowing thoſe fluids as much as poſſible in infected places. From the various affections of the mouth and throat, in many fevers, there can be little doubt of the contagion's having a deeper and more ſerious operation, than upon the mere ſecreted fluids. Do not aphthæ, ſore throats, erythematic affections of the pharynx and gullet, ariſe from the local operation of this poiſon? This manner of accounting for theſe ſymptoms is, in my judgment, more accordant to fact and reaſon, than any thing I have yet met with; for as to the received notions of *eruptions* coming from the blood and inward parts, and *breaking out* upon the ſurface of the body, I think them a very lame part of our pathology.

8. A long continuance of fogs, with damp and drizzling weather, has been found unfavourable in ſickly ſeaſons. The gradual and ſlow precipitation of water from the air keeps the atmoſphere ſo moiſt, that the ſmall drops of water floating

in it enter the lungs with every inſpiration, and carry a portion of contagion along with them as far into that organ as they penetrate. A damp air may thus be ſaid to give ſtrength to contagion, though a dry wind may ſpread the miſchief.

9. From the ſame principle may be deduced an eaſy method of purifying infected goods, apparel, furniture, &c. the moſt efficacious and eaſy method of cleanſing which, is to waſh them in fair water. For this purpoſe the water ſhould be *cold*, that is, of a common ſummer temperature, at which range of heat the contagion readily mingles with it. Linen and other things intended to be waſhed, ſhould never be put immediately into *warm* or *hot* water, as the ſteam ariſing from it is found, by experience, to be offenſive and dangerous. After ſteeping and ſoaking awhile in cool water, the goods may be waſhed out, and *afterwards* put into boiling water, if judged neceſſary, with ſafety. The application of this practice to the caſes of perſons actually ſick, to the purification of bedding, houſes, &c. where ſick perſons have laid or died, and to preventing the introduction of contagion from abroad, is as plain as it is extenſive; and this principle is corroborated by the fact mentioned in your letter, "That Europeans reſiding in Conſtantinople, Grand Cairo, &c. have found, from long experience, that by paſſing every thing they receive, ſuch as food, &c. through water, it is effectually deprived of its power of communicating contagion; or in other words, the peſtilential gas, adhering to its ſurface, is retained by the water."

10. In many caſes of ſickneſs, eſpecially where patients are clad in woollen, and lay on feather beds, covered by blankets, an atmoſphere of contagious vapours may be imagined to ſurround and

cloſely inveſt them. The ſkin, eſpecially of thoſe not accuſtomed to purify it frequently by bathing, is beſet by the ſame fluid, whoſe particles ſeem to inhere in its pores and duplicatures. The long continued immerſion of the ſick in ſhirts and ſheets, rendered damp by perſpiration, is thus not only a moſt unclean but infectious practice. The relief afforded to perſons labouring under indiſpoſition from infection, by plunging into cool water, or, as I prefer, wiping the whole body with a wetted cloth, again and again, ariſes not ſo much from the abſtraction of heat as by removing the irritating and peſtilent matter adhering to the ſurface. The purification of the whole body, by clean water, appears to me to be as neceſſary, in infectious maladies, as cleanſing the ſtomach and bowels by internal remedies; and, I had like to have ſaid, in ſome inſtances quite as beneficial. If the obſervance of perſonal cleanlineſs in this reſpect were more frequent, and chamber-baths, as among the French, more generally uſed as a part of bed-room furniture, contagious diſtempers, I am perſuaded, would be far leſs frequent. The notion of its checking perſpiration being founded on a falſe eſtimate of the animal œconomy, is too idle to liſten to or to refute: and what adds further to the truth of the principle ſtated is, that waſhing the bitten part in cold water, has been recommended as very efficacious in preventing the conſequences of the bite of rabid animals; and the lateſt Weſt-India treatment of yellow fever confirms the utility of the boldeſt uſe of cold water, by daſhing it over the head and ſhoulders with a bucket; or if the infected perſon were unable to ſit up, by wrapping him from head to foot in a blanket dipped in cool ſalt water.

Thus, Sir, we learn, that if the ingredients of atmoſpheric air, (ſeptous and oxygenous gas,) the commoneſt things in nature, do ſometimes get into chemical combination, and produce a peſtilential or non-reſpirable fluid, there is alſo another thing, one of Nature's moſt plenteous productions, which ſeems, in its pure ſtate, to be a ſovereign preventive of a large proportion of their miſchief. With deep eſteem and reſpect, believe me to be very ſincerely yours,

SAMUEL L. MITCHILL.

Plandome, Feb. 6, 1795.

JOHN STEVENS, Eſq. Hobocken.

On the Decompoſition of Contagious Air by Vegetation. In a Letter from Dr. SAMUEL L. MITCHILL, *to* ROBERT R. LIVINGSTON *Eſq. Chancellor of the State of New-York, and Preſident of the Agricultural Society.—Read before the Agricultural Society of the State of New-York, February* 23, 1796.

DEAR SIR,

EVER ſince the idea has been ſtarted of epidemic and endemic diſeaſes being cauſed by liquid or aëriform compounds of the principle of *putridity*, (ſepton or azote,) with the principle of acidity (oxygene) in different proportions, it has appeared to me an inquiry highly worth the making, by what proceſs in nature ſuch vaſt quantities of noxious fluids are decompounded, or taken out of circulation. In my letter to Dr. Miller, of Dover, dated January 20, 1796, I ſtated the facts which occurred to me, concerning the abſorption of this claſs of fluids *by the materials of which houſes are built*, particularly as reſpected the *lime* and *clay* of their walls; and in another communication of Feb. 6, to Mr. Stevens, of Hobocken, I pointed out the conſiderations then preſent to my mind, relative to their *miſcibility with water*. By theſe modes of combination, ſome of thoſe deleterious fluids are ſo damped or repreſſed, that their hurtful powers are quite ſuſpended, until, by a ſevering of the connection they had formed with ſome other ſubſtance, as with lime, clay, water, &c. they break out into action again.

Beſides theſe proceſſes, in which the contagious airs are fixed or connected, ſo as to diſappear for a time from circulation, there is yet another operation in nature which is capable of utterly deſtroying them, and reſolving them into their conſtituent elements. This operation is VEGETATION.

I was induced to this opinion by the following circumſtance: The ſcavengers and carmen of the city of New-York are in the habit of collecting from the ſtreets large quantities of putrid mud and filth, and of laying it in heaps on vacant lots, near the ſkirts of the city, to be converted into manure. Near the ſhip-yards, on the Eaſt River, in the neighbourhood of a number of theſe collections of ſtreet manure, the yellow fever was very rife and deſtructive; and in the opinion of the moſt obſerving inhabitants, a conſiderable ſhare of its violence was owing to their vapours and exhalations in the autumn of 1795. That putrid effluvia ſhould cauſe ſickneſs, is a very ancient idea; but the acquiring a preciſe idea of the nature of putrid effluvia, has at once ſuch an intimate connection, both with agriculture and phyſic, as to render it a matter of more than ordinary importance.

Theſe heaps of manure appear to me to be *nitrous* ſoils, and capable, under proper management, of affording much nitrous acid. The effluvias from nitrous ſoils in Bengal (Martin's Letter in Meigs's New-Haven Gazette, May 22, 1788) and Spain, (Townſend's Travels,) are themſelves nitrous and very noxious. The nitrous nature of putrid vapours appears from Mr. Thouvenel's experiments, (Memoires de l'Académie Royale des Sciences, &c.) and I think from Dr. Prieſtley's (Exp. and Obſ. vol. ii. p. 217.)

The collections of putrefying ſubſtances in the parts of New-York more eſpecially affected by that diſtemper, may be conſidered as ſo many ſmaller dung-heaps, and generating in like manner a vaſt amount of nitrous exhalations. Theſe, when afforded ſufficiently concentrated and copious, by the concurrence of ſufficient heat and moiſture, produce yellow fevers, bilious fevers, &c. and occaſion great panic and alarm in ſociety.

Now, theſe very ſubſtances that cauſe ſo much miſchief and terror in cities, are ſought after with great avidity by farmers, who purchaſe them at a high price, and uſe them with much advantage to fertilize their fields. The beneficial and ſalutary effects of this practice in huſbandry, makes it look as if nitrous acid and nitrous airs were good manures, and that vegetables had the power of decompounding them: that, in ſhort, in the œconomy of plants, there is a proceſs by which the ſepton and oxygene of theſe infectious fluids are ſeparated, and, while the former remains in the vegetable, as a part of its nutriment, the ſurpluſage of the latter, after forming gum, mucus, meal, &c. and other vegetable oxyds, flies off through the upper ſurface of the leaves, in company with heat and light, in the form of vital air.

In order to eſtabliſh this concluſion, it will be neceſſary to ſhow, that vegetables contain the principle of putridity. The moſt ready way of coming at this will be by examining whether they contain ammoniac (volatile alkali). Ammoniac has the ſame radical (ſepton) with nitrous acid, but the two compounds differ from each other in this, that to form ammoniac, ſepton is combined with hydrogene; whereas in the compoſition of nitrous acid ſepton is connected with oxygene. If the volatile alkali then can be produced from plants, it will be a proof that the radical of the nitrous acid (ſepton) is an ingredient in the vegetable ſtructure.

Pit-coal is generally conſidered as a ſubſtance of vegetable origin. In the treatment of coal, to procure tar from it, by Lord Dundonald's proceſs, a large amount of volatile alkali is obtained. That whole claſs of vegetable bodies called funguſes, or the toad-ſtool tribe, yields on analyſis by fire the volatile alkali. The whole claſs of the tetradynamia, to which cabbage, muſtard, horſe-radiſh, &c. belong, are ſuppoſed to contain or to afford a large proportion of it. The glutinous part of meal, flour, or bread-corn, yields it alſo by diſtillation; and indeed moſt plants, urged by a ſtrong fire in cloſe veſſels, or when converted into ſoot, give out the ſame alkaline product. The caſe of ſoot, which affords a good deal of ammoniac, is very impreſſive, as it ſeems to evince the formation of the volatile alkali, by the junction of ſepton with hydrogene in high temperatures, when at the ſame time there is incomplete combuſtion.

There is an experiment of Dr. Prieſtley's, which ſhews the analogy between nitrous acid and volatile alkali. He found (Exp. and Obſervat. vol. ii. p. 43—44) that iron, which had long ruſted in nitrous air, gave out a ſtrong ſmell of volatile alkali. In this experiment, the iron attracts a part of its oxygene from the nitrous air (which always contains a quantity of water), and converts it into azotic gas and azotic oxyd. The iron likewiſe attracts a portion of the oxygene from the water, and ſets looſe a quantity of hydrogene gas. Meantime the metal grows ruſty, or, in other words, is converted to an oxyd. But while this goes on, or afterwards, the component ingredients of volatile alkali are evolved, and thus the azote and hydrogene combine to form ammoniac. An experiment of Mr. Milner's is very much in point. By expoſing alkaline air to ſubſtances containing oxygene, in a red heat, he produced nitrous gas (Phil. Tranſ. vol. lxxix. p. 300.) Here, it ſeems, the hydrogene of the ammoniac quitted its connection, by reaſon of ſome more powerful attraction, and afterwards its radical (azote) combined with the principle of acidity to form nitrous air. We ſee thus, how the azotic baſis, by combining with oxygene, forms a nitrous, or with hydrogene, an alkaline product.

There is thus no difficulty in conceiving whence vegetables get their azote. Nitrous acid, and ſome other combinations of azote with oxygene conſtitute a large proportion of the fertilizing part of ſtreet manure. The powers of vegetation are capable of diſſolving the connection between theſe two materials, and the oxygene evaporates, while the azote attaches itſelf to the plant, as none of its nouriſhing materials. It has been ſaid that volatile alkali exiſts, naturally formed, in ſome plants, and nitrous acid in others; but theſe aſſertions require farther confirmation by experiment. The better opinion ſeems to be, that they are both formed on or by the putrefaction and diſtillation of ſuch vegetable bodies as contain their conſtituent parts. The nitrous acid, and the analogous products, being commonly produced by common putrefaction, in ordinary ſummer heats; and the volatile alkali in high ranges of artificial heat, in diſtillation and incineration.

It ſeems (Prieſtley's Exp. and Obſ. vol. iii. p. 415.) that charcoal is, in ſome caſes, capable of affording azotic air; but this only happens when, after expulſion of all the air it originally contained, it has been afterwards ſuffered to imbibe atmoſpheric air. On expelling this ſecondary portion, there is no carbonic acid procured, but all is azotic air. Its oxygene is probably abſorbed, and, as Bancroft very ingeniouſly conjectures, (Philoſophy of Permanent Colours, &c. vol. i. p. 48.) forms the black oxyd of charcoal.

It may appear like a ſtrange idea, that nitrous acid, and its vapours and airs, ſhould act as manures, and aſſiſt in fertilizing land. It is, however, a certain fact, that this is the caſe; and, on the rapid evaporation and abſorption of theſe compounds, when ſtrewed over the land, can it be explained why ſtreet manure has ſo little durability, and leaves ſo ſoon the fields on which it had been ſpread in a ſtate of exhauſtion. In like manner it becomes eaſy of comprehenſion, why ſpots too highly manured, as well as heaps of manure themſelves, poſſeſs the fertilizing ingredient in a ſtate too ſtrong and condenſed to ſupport vegetable life at all. In order to operate well, and produce its greateſt good effects, this manure ſhould be tempered with common earth, and by no means be ſpread too thick upon the ground. Unleſs this be attended to, the manure will corrode or poiſon the plants it is intended to ſtimulate and nouriſh.

Street dirt and dung thus contain nitrous acid. Vegetables abſorb it, decompound it, and attach its baſis, while they exhale its oxygene through their leaves into the atmoſphere. This baſis, in *common putrefaction*, is ready to combine with oxygene into nitrous acid again; and in *high heats* connect itſelf with hydrogene into volatile alkali.

That ſome extraordinary proceſs of putrefaction went on during the peſtilential autumn of 1795, in New-York, was evident, not only from the general luxuriance of moſt vegetables, but from the production of a ſecond crop of flowers by many plants which commonly bloom but once in a ſeaſon, particularly pinks, apple-trees, and cherry-trees. Notwithſtanding the advantages derived to mankind from the deſtruction of vitiated air, and the production of vital air, by the economy of plants, the police of the city of New York, a few years ago, cauſed a large number of the trees growing throughout the ſtreets to be cut down! And in the ſame ſpirit of proceeding, the committee for preventing the introduction of infectious diſeaſes, though waited upon in perſon, in conſequence of information ſolicited by them on the ſubject of contagion, during the peſtilence of 1795, deemed the principles of the preſent communication not worth the hearing! Is it wonderful we are viſited by plagues? With ſentiments of eſteem and reſpect, I am, Sir, your very humble ſervant,

SAMUEL L. MITCHILL.

New York, Feb. 20, 1796.

EXTRACTS

FROM A

DISSERTATION ON THE OPERATION OF PESTILENTIAL FLUIDS UPON THE LARGE INTESTINES,

TERMED BY NOSOLOGISTS,

DYSENTERY.

By W. BAY, M.D.

The Medical Conſideration of the Subject:

The Cauſe producing Dyſentery, and the Connection between this Diſeaſe and others ſhewn.

HAVING ſhewn that the different gaſes found to exiſt in the alimentary canal are not the cauſe of dyſentery, we further have ſeen that theſe, combined together according to the laws of affinity, are alſo incapable of exciting this diſeaſed ſtate of of the large inteſtines. We ſhall next ſhew that ſepton (azote), combined with the principle of acidity (oxygene), is capable, and, moreover, is the only true cauſe of this diſeaſe. The facts, however, ſhewing that an acid is the cauſe of dyſentery, are of the indirect kind: no experiment as yet has been made to aſcertain the fact; though, from the analyſis of matter taken in as food producing an acid, under certain circumſtances, and alſo excrements being uſed for the purpoſe of obtaining the acid for the formation of nitre (ſeptite of pot-aſh), we are led to conclude that this is the caſe; and the ſame operation which produces this acid out of the body, is found frequently to take place in the inteſtinal tubes. Pringle poſitively declares, that an acid exiſts in the fæces, which he calls "the feculent acid *." The ſeptous acid, on being united with the fæces, inſtead of allaying the fetor, increaſed it, contrary to the expectation of the experimentor †. This acid is called, by him and other writers, the mineral acid ‡. Hence the increaſed fetor of the ſtools of patients in this diſeaſe; and hence alſo a ſtrong proof that the acid of ſepton is the cauſe of this diſeaſe. From the analogy of the food made uſe of by the human ſpecies, it is found to contain the baſis of this acid in a large proportion; for animal diet is much more uſed than vegetables among that part of the human ſpecies which ſuffers moſt from dyſentery. The fæces of a man fed upon coarſe bread has been found to contain a ſalt that detonated like nitre, when expoſed to fire, as made by Homberg. Macquer §, in his remarks on Homberg's experiment, ſays, "that its nitrous character is by no "means ambiguous: its deflagrating on live coals "convinced Mr. Homberg of its being nitre. But "its conſtantly taking fire in the retort, as often "as diſtilled, is a ſure proof that it is a nitrous "ſalt."

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* Diſeaſes of the Army. Appendix, p. 385.

† Pringle, p. 339.

‡ The ſeptous (nitrous) acid has, for a long time, been ſuppoſed to be a mineral production, but has lately been found to be of animal and vegetable origin, produced by putrefaction.

§ Chemiſtry, vol. ii. p. 372.

This alſo is a certain fact, and one in point, to prove that the ſeptic acid is produced or generated in the alimentary canal; and alſo proves the great uſe of the bile in preventing thoſe diſeaſes, by ſaturating the acid with the alkali, and thereby preventing the miſchief which would otherwiſe have been the conſequence.

The ſeptic (nitric) acid formed in the alimentary canal, in this experiment, is ſaturated by the mineral alkali of the bile forming the ſeptite (nitrite) of ſoda. If then this acid be produced in the alimentary canal of a man fed upon bread, in what greater proportion ought it to be found in thoſe who are fed upon lean or muſcular animal matter, which contains the baſis of this acid in a greater proportion than bread or corn! There is no doubt but this acid is more or leſs conſtantly formed in the inteſtinal tube, as proved by the experiment of Homberg; the alkali contained in the bile being in ſufficient quantity to neutralize and form a ſeptic (nitric) ſalt.

Maſſey *, in his paper on ſaltpetre, declares, that the ſtrongeſt ſeptic (nitric) acid is formed in the ponds and tanks, or ſhallow ponds of water, in the Eaſt Indies, by the ſpontaneous decompoſition of animal and vegetable matter in thoſe tanks or ponds. Animal ſubſtances, ſays Pringle †, will putrefy quicker in a confined than in a free air. Maſſey ‡ further aſſerts, that the putrefaction of manures, ſtinking pits, and ditches, produces the nitric acid. Having proved that an acid exiſts in the alimentary canal, and that this is the ſeptic

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* *Vide* Repertory of Arts and Manufactures, vol. i. p. 322.

† Diſeaſes of the Army, p. 339.

‡ *Vide* Repertory of Arts and Manufactures, vol. i. p. 321.

(nitric) acid, I ſhall ſhew from what other ſources this acid is derived, beſides being generated in that canal.

Having eſtabliſhed the fact, that an acid is formed in the inteſtinal canal, and that this is the ſeptic (nitric), it will thence appear evident, how it comes to paſs that this diſeaſe is produced; while no cauſe from without the body can be diſcovered, and eſpecially in that ſeaſon when a few ſporadic caſes are met with. It does not follow from this, that all the dyſenteries ariſe from an internal cauſe; but a much greater proportion proceeds from the gaſeous oxyd and volatile acid of ſepton (azote), taken in the body from without. In an atmoſphere that is incumbered with peſtilential fluids, theſe may affect the ſyſtem of ſuch perſons as are expoſed to their operation by entering in the pulmonic organs, there mixing with the blood, and exerting its influence on the heart; and as the blood paſſes in its routine of circulation, give to the contents of the alimentary canal a part of its deleterious quality, or may be taken into the ſtomach during the time of our meals, and be ſwallowed with the food. From their miſcibility with water and fluids in general, the ſaliva becomes another mode of carrying it into the alimentary canal; and laſtly, it is abſorbed from the atmoſphere by the numerous abſorbing veſſels ſpread over the whole ſurface of the body, in the ſame manner as mercury and other ſubſtances are taken up by theſe veſſels, when applied to the ſkin. From theſe different modes in which peſtilence penetrates the body, it will appear what vaſt quantities of the matter of contagion may be taken in, and why it happens that the patient is ſo frequently attacked in the ſpace of a few hours after being expoſed to ſuch air, provided that the atmoſphere which he breathes be highly charged with the matter of contagion. It is owing to peſtilence alſo, that a fever is produced, which is termed dyſenteric fever: ſo ſtrong is the connection of fever with dyſentery, that it is reckoned a neceſſary ſymptom by writers on this diſeaſe; but a dyſentery, or, at leaſt, the affection of the large inteſtines, which, when united with fever, is called dyſentery, may exiſt for a ſhort time without fever: this, however, is only in ſporadic caſes, where there is no vitiated ſtate of the atmoſphere; but ſo quick is the abſorption of this fluid from the large inteſtines, that it is taken into the circulation, and, operating upon the heart and arteries, produces that particular action of the ſanguiferous ſyſtem termed fever, almoſt as quick as the operation of its effect upon the alimentary canal. On the contrary, the fever may exiſt previous to any affection of the large inteſtines, provided the exciting cauſe be taken to the blood-veſſels by the pulmonic organ, and, through means of the blood, impart it to the large inteſtines.

Marſh-miaſmata have, for a long time, been conſidered as the cauſe of this diſtemper, together with putrid fumes. Let us conſider what theſe cauſes are, and wherein they differ. Marſh-miaſmata are the fumes ariſing from ſwampy and marſhy ſoils, wherein are found vaſt quantities of frogs, newts, inſects, and other animals of the like kind, together with vegetable ſubſtances, which are continually undergoing ſpontaneous decompoſition by putrefaction: theſe impart to the water and ſoil a ſtrong ſeptic (nitric) tincture, which, evaporating by the heat of the ſeaſon, imparts its deleterious quality to the atmoſphere, where it floats, and is wafted by the wind in every direction, and affects ſuch perſons as are in its neighbourhood. This will appear the more certain by a fact taken from Maſſey [*]: his words are— "But it muſt not be forgotten, that their [ſpeaking of the Eaſt Indies] ſtrongeſt nitrous (ſeptous) "earths are found at the bottom of their tanks "and ſhallow ponds of water, which in that country are often of great extent, and in which, the "water being evaporated by the heat of the ſun, "large quantities of fiſh are left to corrupt, which "furniſhes a mud of the *ſtrongeſt nitrous* (ſeptous) "*quality*." Hence marſh-miaſmata, or the fumes ariſing from marſhes, are nothing but the gaſeous oxyd of ſepton (azote), and ſeptic acid gas; and the dyſentery produced by marſh-miaſmata is conſequently owing to the ſeptic (nitric) quality of the water with which it is made to exhale by heat; for the evaporation of the pure water certainly would not have the ſame effect, as there is nothing deleterious in this fluid. Pringle [†] ſays, "the "intermitting fever, cholera, and dyſentery, may "as properly be called the endemics of camps as "of low and *marſhy* countries."

Fumes from corrupting animal and vegetable ſubſtances are another cauſe capable of producing dyſentery, and as ſuch are enumerated by ſome authors. Let us alſo examine what putrid vapours are, and wherein they differ from marſh-miaſmata. The product of putrefaction has been fully ſtated to be the formation of certain new compounds from decaying organic matter. The oxygene and ſepton (azote), combining during this proceſs, form the ſeptic (nitric) acid. "Putrid juices and "vapours are diſperſed through the earth and air,

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[*] *Vide* Repertory of Arts and Manufactures, vol. i. p. 323.

[†] Diſeaſes of the Army, p. 10.

"ſo that there are few earths of an abſorbent kind, "that are not in ſome degree nitrous *." All theſe ſeptic vapours which are enumerated, and which have been ſuppoſed to be of different kinds, are capable of producing dyſentery, and are in reality ſimilar; excepting that, in the one, this peſtilential fluid is formed in low and marſhy ſituations, while the other undergoes the ſame proceſs in any ſituation favorable to putrefaction. Dyſentery may ariſe from two cauſes; from acrimony generated in the body, and from putrid ſteams. "A remarkable caſe occurred to me, of a perſon "ſeized with dyſentery, upon ſmelling of human "blood become putrid by ſtanding ſome months in "a cloſe phial †." Now it is known, that the vapours of putrid blood, attracted by chalk, form calcareous nitre, and are conſequently of a ſeptic nature. How far, and what agency or qualities animal diet poſſeſſes capable of exciting this diſeaſe of the large inteſtines, has already been ſhewn. I intended to have ſhewn further, that it poſſeſſed, in ſome degree, this quality, by comparing the diſeaſes of the inferior order of animals with thoſe of the human ſpecies; but the diſeaſes of the domeſtic, as well as thoſe of wild animals, are as yet hidden behind the curtain of obſcurity. No perſon has conſidered it of much moment to note the diſeaſes incident to brutes, not even thoſe of that majeſtic and uſeful animal the horſe. I truſt, however, that when we come to pay more attention to the diſeaſes of the brute creation, we ſhall find that thoſe who make uſe of ſuch diet as contains ſepton,

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* *Vide* Repertory of Arts and Manufactures, vol. i. p. 324, & ſeq.

† Pringle on the Diſeaſes of the Army, p. 227.

whether animal or vegetable, will be found to be ſubject to this diſeaſe, and to all the other diſtempers ariſing from the ſame general cauſe.

An Examination whether and in what Manner the Dyſentery and Intermitting and Remitting Fevers are infectious.

In conſidering the manner, and under what circumſtances, the dyſentery and intermitting and remitting fevers are infectious, it will only be neceſſary to ſhew, that if any one of them be ſo, it will be a neceſſary conſequence that the others are capable of communication from one to the other, under ſimilar circumſtances, as they are all produced from the ſame cauſe, but differently modified. I ſhall ſhew, in the firſt place, that dyſentery is infectious, as it has been a matter of great diſpute, for a long time, and has been warmly conteſted between the two parties engaged in this ſpeculation. I do not undertake to ſide with either party, but will endeavour to evince that both are wrong, and that the truth lies between.

The dyſentery may or may not be infectious: this, however, depends upon circumſtances. If, for inſtance, a patient be kept in a peſtilential atmoſphere, as in that of moſt bed-chambers in which perſons ſick with diſeaſes are; if it be not frequently changed, together with the linen and ſheets; and if the diſcharges by ſtool, which are fetid, be ſuffered to remain in the room; and whenever cleanlineſs is neglected; under theſe circumſtances this diſeaſe will be infectious. But, on the contrary, where every attention is paid to cleanlineſs, the room frequently changed and ventilated, with a due regard to theſe circumſtances, it will be found that it is not capable of being communicated from one to the other; and by this means it will be prevented from ſpreading to thoſe who are neceſſarily obliged to be about the diſeaſed perſon. The reaſon why this diſeaſe rages ſo violently in camps, and other places where a great number of perſons are crowded together, is becauſe of an inattention to cleanlineſs, and a proper care of removing all putrid ſubſtances from about their habitations: the diſeaſe is continually receiving additional quantities of this peſtilential fluid from the exhalations from their bodies; to which may be added what is derived from their privies.

Pringle * found the camp-dyſentery always contagious when it appeared in the fall.

Baron Van Swieten † relates a caſe where a phyſician, who was engaged in an examination of the ſtools of a dyſenteric patient, fell ill with the diſeaſe himſelf, as alſo the perſon employed to waſh the linen which had been dirtied by the ſtools.

Zimmerman ‡ informs us, that dyſentery becomes infectious by the extreme putridity of the ſtools; that the moſt healthy ſubjects, and even animals, are affected with it. This author further relates an account of a dyſentery which had been brought from Amſterdam to Nimiguen, and thence ſpread to fifty Dutch places, and carried off a great number of people. This diſeaſe, continues he, was ſo malignant at Bern in 1768, that thirteen thouſand died with it §.

Pringle || was a man whoſe opportunities were very great, while in the army, to make obſervations

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* Diſeaſes of the Army, p. 214.

† Vol. ix. p. 357, & ſeq.

‡ Vol. ii. p. 126.

§ Vol. ii. p. 127.

|| Page 22.

on this diſeaſe, and was alſo a very nice and accurate obſerver; and it is on this account that I refer my reader ſo often to his writings. He gives an account of the ſtate of the ſick while the army was in Hannau: there were about fifteen thouſand perſons ſick; the greateſt number were affected with dyſentery, by which means the air became vitiated to ſuch a degree, that not only the reſt of the patients were attacked with this diſeaſe, but alſo the apothecaries, nurſes, and attendants, with moſt of the inhabitants of this village.

Theſe facts, taken from authors the moſt reſpectable in the profeſſion, will, I truſt, be ſufficient to convince every candid reader, that this diſeaſe, under the circumſtances which I have mentioned, will, to a certain degree, be infectious. On the contrary, where oppoſite circumſtances exiſt, this diſeaſe will be found incapable of being communicated from the one to the other, as daily experience muſt evince: it will not be neceſſary, therefore, to produce proof to corroborate this, as it is a well-known fact, that dyſentery, attacking a patient whoſe ſituation in life is ſuch that a proper attention can be had to keep his apartment clean, and every thing neat about him, rarely or never infects the attendants. What has been advanced with regard to dyſentery, will hold good with the intermitting and remitting fevers. But, as it is generally ſuppoſed that the intermitting fever is not infectious, I ſhall produce an authority to prove that it is. Cleghorn, in his Diſeaſes of the Iſland of Minorca*, ſays, "tertians have as "good a right to be called infectious, as the "meaſles or the ſmall-pox." That the fevers commonly remitting are alſo infectious, is a well-eſtabliſhed fact. That the remitting fever, of which kind the jail is conſidered, is infectious, will appear from the authority of Mead †. "Nothing," ſays this author, "approaches ſo near "the firſt origin of the plague, as air pent up, "loaded with damps, and corrupted with the "filthineſs that proceeds from animal bodies. "Our common priſons afford us an inſtance of "ſomething like this, where very few eſcape what "they call the jail fever, which is always attended "with a degree of malignity."

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* Page 132.

I am aware of the arguments which thoſe who do not believe theſe diſeaſes capable of being communicated from the ſick to thoſe who are in a ſtate of health, will uſe to maintain the poſition, that they are either epidemical or endemical from the peſtilential ſtate of the atmoſphere; and that every perſon will be more or leſs liable to be affected with thoſe diſeaſes from this cauſe. I grant this to be the caſe generally. But will not the perſons who attend and nurſe the ſick be more liable to be affected than thoſe who are not converſant with them? I anſwer, yes, moſt certainly; and I am ſupported by the authority of Cleghorn and Fordyce, who both declare this to be the caſe; and this is eaſily reconciled; for there is always exhaling from the ſick infectious effluvia, which in general may not be ſufficient to produce the diſeaſes; yet we are warranted to believe, that they may be ſometimes capable of exciting theſe unhealthy ſtates of the ſyſtem.

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† Mead on the Plague, 110, 111.

The Method of Prevention.

HAVING completed the conſideration of the phyſiological, and entered upon the pathological parts of the ſubject, it yet remains incumbent on me to conſider the method of prevention and cure. The prevention of diſeaſes is as much the care of the phyſician, as the cure of them, and requires a greater degree of penetration and diſcernment, as a perfect knowledge of the cauſes, and alſo the circumſtances neceſſary to produce them, is requiſite. The cure, in ſome caſes, may be made from a mechanical knowledge of medicine. In order, however, to prevent this diſeaſe, the following indications ought to be obſerved.

1ſt. The patient ſhould avoid all ſeptic aliment, ſuch as the whole claſs of animal ſubſtances, except their oils and fats, in that ſeaſon of the year in which the diſeaſe is moſt prevalent, and ſubſtitute a vegetable diet. Lean and muſcular animal ſubſtances, as has been ſhewn, contain a large proportion of the baſis of peſtilential fluids, which, combined with oxygene, have been proved to be the cauſe of dyſentery; and, on the contrary, that vegetables contain it in a leſs proportion: hence, then, it follows, that vegetable diet is to be preferred to that of animal. The atmoſphere is impregnated with this deleterious fluid, which, being taken into the body by means of the ſtomach, lungs, and abſorbing veſſels, will, if there be no addition from within, produce only a mild affection; but if, through ſeptic aliment, there be an addition from within, the diſeaſe will be aggravated, and inſtead of a mild dyſentery, a more violent affection will enſue: from which the neceſſity of prohibiting ſeptic food muſt be evident.

2d. The next conſideration which preſents itſelf to our view, is the avoiding coſtiveneſs. This has been univerſally conſidered by Hippocrates, Galen, and their followers down to the preſent time, to be an important conſideration in preventing diſeaſes in general; and in no caſe will it be found more neceſſary than in the preſent. The fæces, by remaining ſtagnant in the alimentary canal, and undergoing putrefaction, will produce the peſtilential fluid, or the cauſe of this diſtemper of the large inteſtines, as has been proved in a former part of this diſſertation; and by this means, if there be no addition of ſeptic (nitric) acid from the atmoſphere, a ſporadic dyſentery will be produced. Coſtiveneſs alſo weakens the body, and prediſpoſes it to the operation of contagion; by which means it leſſens the power of the ſyſtem to become habituated or ſeaſoned to the influence of the ſtimulus of peſtilence: it alſo indicates an interruption in the proceſs of digeſtion. It will appear evident, that this ſtate of the bowels ought to be attended to, from this conſideration, that the fæces being ſuffered to undergo putrefaction in the inteſtinal tube, the matter of contagion will be formed there: this being united with a peſtilential ſtate of the atmoſphere, the patient will be more liable to be affected by it than thoſe who receive no addition from within; and if the peſtilential ſtate of the atmoſphere ſhould be ſo conſiderable as to be ſufficient to produce this diſeaſe, it certainly will be aggravated by ſuch addition.

3d, and laſtly. The patient ſhould avoid a peſtilential air, which, according to the ſtate of impregnation of the atmoſphere, will be found more or leſs liable to affect the alimentary canal;

nay, ſuch ſituations ſhould be avoided as the only certainty of eſcaping the diſeaſe. Although ſome conſtitutions are capable of remaining in tainted atmoſpheres without being taken ſick, owing to the ſyſtem becoming habituated to the action of this ſtimulus; yet this is no certain criterion to form a judgment, whether or no a perſon will eſcape the operation of this peſtilential fluid: this, however, is certain, and for the reaſons before ſtated, that perſons abſtaining from animal diet will be more likely to eſcape infection under ſimilar circumſtances, than thoſe who make a free uſe of it. For the ſame reaſon it will appear, that of two perſons, under a ſimilarity of circumſtances and ſituation, the one uſing animal food, the other vegetable; the former will be more ſeverely attacked by this diſeaſe than the latter. If proper attention be paid to theſe circumſtances, they will generally prove ſufficient to prevent any affection of the large inteſtines: it will, however, frequently happen, from the particular circumſtances of ſome inhabitants, that theſe obſervations cannot be complied with, and they will be attacked with this malady: they will therefore become the objects of cure.

The Method of Cure.

In order to make a cure, the phyſician muſt adminiſter ſuch remedies as will prevent the diſeaſe, or exciting cauſe, from wearing out the excitability of the part affected. When I ſpeak of curing the diſeaſe, I would not wiſh to be underſtood as meaning to preſcribe a ſpecific; for we have no ſuch medicine; and it is a doubt whether any ſuch remedy has ever cut ſhort a diſeaſe: I therefore mean ſuch remedies as will leſſen the operation of the cauſe, in order that the body may not ſink under its deleterious operation; and in ſo leſſening this fluid, the body will, with greater certainty, become habituated to this particular action of the exciting cauſes; particularly as the diſeaſe will run its full time before a perſon can recover from any attack. It is upon this principle that all diſeaſes are ſaid to be cured, though the recovery has been aſcribed to certain remedies, and it is upon this principle that we can reconcile and explain the ſucceſs with which ſome oppoſite remedies have been in vogue, in curing diſeaſes. Phyſicians may be equally ſucceſsful in certain mild diſeaſes, although they make uſe of the moſt oppoſite remedies. The conſtitution of man poſſeſſes the power of becoming habituated to the action of certain ſubſtances which are deadly in their operation beyond conception. We find that the moſt inveterate poiſons may be taken with impunity, and little or no inconvenience be experienced from them, provided a certain quantity be taken at firſt, and gradually increaſed. If a perſon, who is not accuſtomed to poiſonous matter, take a doſe leſs than one which an habituated perſon may take, immediate death will be the conſequence. This power to take large quantities of poiſons is ſufficiently verified in the ſingle inſtance of perſons who are capable of taking a wine-glaſs full of laudanum without experiencing any other effect than a ſpecies of intoxication; while, on the contrary, a perſon unaccuſtomed to its ſtimulus would die almoſt inſtantly. Who is that preſumptuous phyſician that would pretend to cure the ſmall-pox? I believe none will be found who has hardineſs enough to attempt any ſuch thing. The only circumſtance to which the phyſician has to attend, is to prevent the variolous poiſon from producing indirect debility: the conſtitution will become gradually habituated; and in this manner the patient gets well. The ſame thing takes place in the meaſles; and I have not the leaſt doubt that every diſeaſe has a certain period to which it will run in ſpite of all the healing art can do, and at which time the body will become habituated to the ſtimulus producing the diſeaſe. There are, however, ſome conſtitutions which require a longer time to become familiarized than others; and when they are incapable of becoming habituated, death muſt enſue; as it muſt alſo when the degree of the exciting cauſe is very conſiderable, and receiving continual additions.

The indications of cure are three: 1ſt. To remove ſeptic and feculent matter from the alimentary canal. 2d. To correct the vitiated ſtate of the atmoſphere, or to remove from it. 3d. To allay the inflammation, and the other injuries which the alimentary canal may have ſuſtained by the original cauſe of the diſeaſe, and the remedies made uſe of to effect a cure.

1ſt. Great care ſhould be had to evacuate the contents of the inteſtines freely, in order to remove any ſeptic or feculent matter which may be found there. The reaſon for this precaution is obvious, as theſe ſubſtances, if left in the alimentary canal, would act as a fountain to foſter or generate the original or exciting cauſe, and add to the violence of the diſeaſe. The remedies which I ſhall recommend for this purpoſe are, the carbonate of pot-aſh (ſalt of wormwood), acetite of pot-aſh (regenerated tartar), ſulphite of pot-aſh (vitriolated tartar), tartrite of pot-aſh (ſoluble tartar), tartrite of ſoda (Rochelle ſalt). Theſe ſalts are decompounded by the ſeptic (nitric) acid, which coming in contact with them, the alkaline baſes will part with the acids with which they are combined, and unite with the ſeptic according to the laws of attraction, and form with them ſeptites. By this means the cauſe of the diſeaſe will be removed, and the patient reſtored to his former ſtate of health. The muriate of ſoda (common ſea ſalt), with the vegetable acids, is alſo highly recommended in this diſeaſe. Wright * obſerves, that marine ſalt diſſolved in any of the vegetable acids, operated as a charm in dyſenteries, in the iſland of Jamaica, when all the other remedies which have been celebrated in curing this diſeaſe had failed.

This is corroborated by the experience of others. This ſalt, like all the others, owes its good effects to the alkali with which the marine acid is combined, the ſeptic (nitric) acid being ſtronger, and having a more powerful attraction for ſoda, than the muriatic: the ſoda quits its combination with its former acid, and combines with the ſeptic (nitric), forming a ſeptite of ſoda.

The vegetable fixed alkali (carbonate of pot-aſh) will be found to be a very efficacious remedy in this diſeaſe, as appears from its effects in the two caſes annexed to this paper, where it has had the deſired effect, while all the other remedies generally employed had failed. The doſe which may be given with ſafety is, four grains diſſolved in half an ounce of water, and repeated every two or three hours, until natural ſtools are evacuated. If jalap or rhubarb be combined with vegetable fixed alkali (carbonate of pot-aſh), its operation will be greatly aſſiſted; for while the pot-aſh attracts the ſeptic

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* Medical Commentaries, Philadelphia edition, vol. vi. p. 121.

(nitric) acid, and deſtroys its deleterious quality, the jalap or rhubarb will tend to remove the matter contained in the alimentary canal. The oleum ricini and the cerated glaſs of antimony have alſo been found to be of ſervice in removing the contents of the inteſtines. After having evacuated the inteſtines, we are next to endeavour to relieve our patient of the teneſmus: this will be anſwered by making uſe of the ſtarch enema with the tincture of opium; a mucilage made of any of the gums, as the gum arabic, a decoction of marſh-mallows, with laudanum, or an oleaginous mixture with anodynes. While the tincture of opium tends to take off that extreme irritability of the inteſtines, the ſtarch forms a ſheath for them, which defends them againſt their acrimonious contents, and in this manner ſupplies the place of the mucus, which is deſtroyed by the ſeptic acid.

While we are turning our attention to the alimentary canal, we ſhould not neglect to cleanſe the body externally, in order to remove all ſeptic matter from its ſurface, which, if neglected, would, in a great meaſure, retard the recovery of the patient. For this purpoſe I would recommend the cold bath, which, while it cleanſes the body, will, at the ſame time, ſubduct the ſtimulus of heat, and make the patient more comfortable, and alſo produce a diaphoreſis.

2d. After having cleared the alimentary canal of the peſtilential matter exiſting there, the next circumſtance which requires the attention of the phyſician, is the ſtate of the atmoſphere ſurrounding the patient. The vitiated ſtate of it is to be corrected; or, if we ſhould not ſucceed, we are to remove the patient. The chamber of the ſick ought to be perfectly ventilated, and frequently changed; and care ſhould be taken, immediately after the removal of the ſick, to clean the floors with alkaline ley, and white-waſh the walls with lime. By this means the peſtilential matter will unite with the lime and alkali, and form ſeptites, and thus be taken out of circulation.

Sprinkling cloths with vinegar would ſupply a grateful odour to the ſick. The food of the patient muſt not be cooked in an impure atmoſphere; for peſtilential fluids have a great tendency to mix with water; neither ought the drinks of the patient to be ſuffered to remain in vitiated air; for, through the neglect of theſe precautions, we may unexpectedly find the diſeaſe increaſed, without being able to account for it. The frequent changing of the bed-clothes will alſo greatly contribute to the recovery of the patient, as it is a notorious fact, that they are capable of imbibing large quantities of the matter of contagion, eſpecially woollens, cottons, and feather-beds; and further, they are very apt to communicate it to perſons who are in health: we cannot, therefore, be too careful and attentive to theſe circumſtances. The linen of the ſick ought alſo to be very frequently changed, as much of the ſucceſs of our practice depends upon a due attention to cleanlineſs.

I cannot, in this place, help noticing a practice which commonly proves too fatal to the ſick, but which has been ſtrenuouſly recommended by certain practitioners, in order to purify the atmoſphere: —a method which muſt appear to every intelligent and candid obſerver as highly reprehenſible; and, inſtead of purifying the atmoſphere, muſt make it leſs pure than before:—a practice which muſt be conſidered to be injudicious and improper in the extreme, and can only be the reſult of ignorance and prejudice. The practice I allude to is the burning of certain combuſtible ſubſtances, as tar

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and ſulphur; nay, any attempt to purify the air by combuſtible materials ought to be avoided, as they act powerfully in vitiating the atmoſphere; and upon this principle; during combuſtion, oxygene (vital air), ſo neceſſary to ſupport flame, is abſorbed, by which means that vital fluid which already exiſts in too ſmall a proportion in the atmoſphere, is deſtroyed, and thus the air neceſſary for animal exiſtence will be entirely expelled, or at leaſt ſo much diminiſhed as to endanger the life of the patient.

If, however, we ſhould not ſucceed in purifying the atmoſphere, we ſhould remove the ſick out of it into that which is uncontaminated by this peſtilential poiſon. This precaution we ought never to omit, whenever the ſituation is ſuch as to render it practicable. This will greatly accelerate the recovery of the ſick, as every addition from without muſt greatly retard the cure, and moſt generally will wear out the conſtitution, and cauſe the death of the patient; for, during the continuance of the patient in ſuch an atmoſphere, the power of becoming habituated to the diſeaſe may not always be ſufficient to counteract the continual accumulation of the peſtilential ſtimulus.

3d. In the laſt place, we are to turn our attention to allay the inflammation, and other injuries which the alimentary canal may have ſuſtained, by the original cauſe of the diſeaſe and the remedies made uſe of in order to effect a cure. For this purpoſe bleeding will be neceſſary, not only to allay the inflammation, but alſo to prevent the matter of infection from wearing out the excitability of the heart, and producing indirect debility, and its frequent conſequence, death. That there is infectious matter in the ſanguiferous ſyſtem, is certain, from the fever which attends this diſeaſe. While we adminiſter cathartics to the alimentary canal, we ſhould not neglect to purge the blood-veſſels, and ſubduct the ſtimulus or infectious matter from the blood; the bleedings ſhould be ſmall and frequent; but this, in a great meaſure, muſt depend upon the judgment of the practitioner, as circumſtances ſhould require. We ſhould not be deterred from taking a ſufficient quantity on the approach of ſyncope, as no bad conſequence will ariſe from this circumſtance; nor ſhould we be prevented from repeating it from the diſeaſe or fever not yielding to the ſecond or third bleeding, nor, in the firſt inſtance, from the ſmallneſs or weakneſs of the pulſe, as it will riſe after or during bleeding. In this manner the blood-veſſels will be emptied or cleared of the matter of infection; when the patient ſhould be directed to take nouriſhing ſoups. In order to ſhow more clearly how bleeding will leſſen the quantity of peſtilence contained in the blood-veſſels, I ſhall explain in numericals. Suppoſe, for inſtance, the blood contains peſtilential matter equal to 100, and by bleeding you draw off a portion equal to 20, it is evident that there will remain infectious matter equal to 80: if, therefore, the operation be repeated two or three times, you will reduce it to leſs than half its original quantity. This is not the only advantage derived from bleeding: it is a powerful ſudorific, which is alſo of conſequence to be attended to, as the remedies commonly adminiſtered for this purpoſe are too ſtimulant: the moſt of them contain opium, and therefore ill accord with the inflammation in the inteſtines. The injuries which the alimentary canal has ſuſtained from the original cauſe of the diſeaſe and the remedies, ought alſo to be attended to. It will perhaps be aſked, what injury the remedies do to the inteſtinal canal? or how it can be

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poſſible that remedies can do that injury, and yet the patient get well? The medicines made uſe of for this purpoſe muſt certainly have ſome effect upon the guts, or otherwiſe they would not be capable of producing any change whatever, but be inert, which is not the fact. They muſt operate from ſome ſtimulant quality inherent in them; and every thing that ſtimulates muſt leave an effect after the operation of ſuch ſtimulus; but ſtill the good effect which they produce greatly overbalances the ſituation in which they leave thoſe parts, which is much leſs than the original cauſe, and from which the patient will ſooner and very readily be relieved by the efforts of Nature alone. To ſhew this, I ſhall ſuppoſe the operation of the peſtilential fluid to be as 100, and the effect of the remedy as 10: now, if by giving the remedy, we remove the original cauſe, which is as 100, there will remain a diſeaſed ſtate of 10 in the alimentary canal; conſequently the leſſer evil will be preferred to the greater. To repair theſe injuries, mild tonics, and a rich and nouriſhing diet, together with pure air and gentle exerciſe, will be ſufficient.

The diet for the uſe of the patient ſhould be rich ſoups, milk, and vegetables: the lean part of animals ought to be prohibited during the whole period of the diſeaſe; and even when the health of the perſon is reſtored it ought to be uſed very ſparingly, as it would be liable, from the powers of digeſtion being weakened, to bring on a relapſe: it could not be completely digeſted; and putrefaction would take place, and regenerate the cauſe of ſickneſs, more eſpecially if the diſeaſe occurred in that ſeaſon when the atmoſphere is more or leſs charged with peſtilential vapours.

The tonics ought to be mild, as the excitability muſt be reduced to the healthy ſtandard, otherwiſe we ſhould endanger the patient by producing another diſeaſe; for the exceſs of ſtimulus deſtroying the excitability, or reducing it beneath the healthy point, will occaſion a diſeaſe as dangerous as the original. An infuſion of the chamomile flowers has been much eſteemed: if to this infuſion a ſmall proportion of the carbonate of pot-aſh (the ſalt of wormwood) be added, it will be greatly aided in its operation; for this reaſon the debilitated ſtate of the ſtomach and inteſtines, from the operation of the ſeptic compounds, will incapacitate them from performing their functions completely; conſequently a ſmall portion of the ſeptic acid will perhaps be formed, and endanger a relapſe. Now, while the tonic quality of the infuſion tends to reſtore the ſyſtem to its healthy point, the alkali will aſſiſt it, by deſtroying the ſeptic compounds which may be formed, and thus tend to prevent a ſecond attack, and inſure a more ſpeedy recovery. The colombo, the cinchona, and all the other mild tonics, may be uſed; but the particulars of them muſt be left to the preſcriber and the particular circumſtances of the patient.

The Theory of Peſtilential Fluid.

THE theory of contagion is ſimply this, that ſepton (nitrogene) in combination with oxygene (the principle of acidity) forms a compound which, when applied to the bodies of animals, will produce the varieties of fevers and other infectious diſeaſes, according to the parts to which it is applied; and theſe will be inveterate or mild, according to the degree of combination of theſe ſubſtances. In the firſt degree, it will form the gaſeous oxyd of ſepton; in the ſecond, the ſeptic gas; in the third, the ſeptous acid; in the fourth, the ſeptic acid; and in the fifth degree, the oxygenated ſeptic acid.

The ingredients of this matter of contagion conſtitute the chief part of our atmoſphere; they exiſt in the following proportions: ſeptous gas, 72 parts of an hundred, and 28 parts of oxygene. Hydrogene gas and carbonic acid gas are ſometimes found exiſting in the atmoſphere; but they are only conſidered accidental, and not neceſſary. The particles of theſe fluids float about, in ordinary circumſtances, through each other, by means of the wind, which are neceſſary to keep them mixed, in like manner as oil is kept mixed in water by a continual agitation; but no ſooner is the oil and water ſuffered to be at reſt, than they ſeparate; and the ſame would take place with the component parts of the atmoſphere, were they not kept in continual motion by the winds, as they differ in many degrees of ſpecific gravity. But theſe have, under certain circumſtances, attractive powers ſtrong enough to make them frequently combine. The principal cauſe which prevents their combination, after they have acquired an aërial form, is the greater affinity they have for caloric or the matter of heat (which gives them the properties of an elaſtic fluid) than for each other. Whenever, therefore, ſepton (nitrogene or baſis of azotic air) and oxygene (baſis of vital air) can come together, without aſſuming the aërial form, they will combine together according to the laws of chemical affinities, and conſtitute, in this form, peſtilential fluids, varying in proportion to the degree of oxygenation, and poſſeſſing qualities very different from either of their elementary or component parts.

This combination is produced by the particles of the one becoming intimately and chemically blended with thoſe of the other: this will take place in every circumſtance where they can come in contact with each other before their union with caloric, or the matter of heat. This chemical union is moſt generally the product of the putrefaction of the greater part of animal ſubſtances, except their fat; and of vegetables which contain ſepton, ſuch as wheat, coffee, &c. Rain-water is found to contain a conſiderable proportion of the ſeptic acid, as alſo the wells and reſervoirs of hot climates. It is alſo found to exiſt in the plaiſtering and walls of old houſes, eſpecially if the inhabitants have lived in an unclean manner, and the houſe ſtood in the neighbourhood of foul and corrupted vapours. Jails are alſo found to have the lime ſaturated with ſeptic acid. This is verified by the following deſcription of the late keeper of the ſtate-priſon of Olmutz, where La Fayette was confined: "Beſides many other inconveniences, "the ſituation of the dungeon is rendered more "unwholeſome by the vicinity of the barracks on "one ſide, and the common neceſſary-houſe on "the other, the damp of which is ſo great as to "cauſe the walls to be covered with ſaltpetre *. "The *ſtagnated water* of the Morawa, cloſe to "them, not only breeds innumerable ſwarms of "inſects, and thick vapours, but that branch

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* The ſal muralis of Walker, terrene nitre of Cronſtedt, and nitre calcaire of Morveau.

" which paſſes along the walls, under their windows, being, by its depth, favourable to carry " off the filth, &c. of the city, has become its " common ſewer; to which circumſtances is attributed the reputed inſalubrity of the town. Add " to this, that the neareſt buildings are, on one " ſide, the military, and on the other, the city " hoſpitals *."

Before I leave the ſubject of peſtilential fluids, I ſhall make a few remarks upon the ſimilarity of theſe ſentiments with ſeveral paſſages in Darwin's Zoonomia. In treating of the *febris a pure clauſo* †, he has the following ſentence: " In this fever, " the matter not having been expoſed to the air, " has not acquired oxygenation; in which a new " acid, or ſome other noxious property, is produced, which acts *like contagion* on the conſtitution, inducing fever-fits, called hectic fever, " which terminate in ſweats or diarrhœa; whereas, as the matter in the cloſed abſceſs is either " not abſorbed, or does not ſo affect the circulation as to produce diurnal or hectic fever-fits; " but the ſtimulus of the abſceſs excites ſo much " ſenſation as to induce peſtilential pyrexia, or " inflammatory fever, without ſuch marked remiſſions."—" But in the pulmonary ‡ ulcers, " which cannot protect themſelves from the air " by forming a ſcab, the uncombined oxygene " of the atmoſphere unites with the purulent matter, converting it to a *contagious ichor*, which, " by *infection*, not by *eroſion*, enlarges the ulcers,

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* Vide account publiſhed in M'Lean and Lang's paper, Feb. 15, 1797.

† Zoonomia, vol. ii. Claſs II. 1. 6.

‡ Vol. ii. p. 288.

"as in the itch and tenea, &c."—"Another[*] proof of the ſtimulant quality of oxygene appears from the increaſed acrimony which the matter of a common abſceſs poſſeſſes, after it has been expoſed to the air of the atmoſphere, but not before; and probably all other contagious matters owe *their fever-producing property to having been converted into acids by their union with oxygene.*"—"The matter[†] depoſited in large abſceſſes does not occaſion hectic fever, till it has become oxygenated by being expoſed to the open air, or to the air through a moiſt membrane: the ſame ſeems to happen to other kinds of matter, which produce fever, or which occaſion ſpreading ulcers, and are thence termed contagious."

His *febris a pure aerato*[‡] is aſcribed to the union of the oxygenous portion of the atmoſphere with the effuſed pus, converting it to *a weaker kind of contagious matter.* Doubtleſs, in the caſes alluded to by Darwin, the *oxygene* combines with *ſepton* (nitrogene), and the acid formed is the *ſeptic* (*nitric*) *acid.* This is the product which Mitchill ſuppoſes to be occaſionally formed from the materials of ſome articles of diet, in the alimentary canal, and to cauſe certain nauſeas, vomitings, gaſtrites, diarrhœas, choleras, dyſenteries, &c. and thence abſorbed by the lacteals, or from the ſurrounding air, which he conſiders as poiſoned by it, by exhalations from putrid ſubſtances in peſtilential ſeaſons, by the lymphatics of the ſkin and lungs, and excites various commotions in the heart and ſanguiferous ſyſtem, aſſuming the form of continued, remitting, and intermitting fevers. What is particularly to be noticed is, that it does not appear that this coincidence of opinion between our *Profeſſor of chemiſtry* and the *Philoſopher of Derby*, is the reſult of any communication of ideas between them on the ſubject; Dr. Darwin having indeed publiſhed his book before Dr. Mitchill wrote, but Dr. Mitchill having gone deeply into the ſubject, and delivered his doctrine of peſtilential fluids in his lectures, the winter of 1795-6, before the volume, whence the above extracts are taken, had reached America.

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[*] Zoonomia, vol. ii. p. 689. [†] Page 729. [‡] Page 285.

Effects of Peſtilential Fluids (Combination of Scpton with Oxygene) upon the Sanguiferous Syſtem of Animals, particularly the Human Species. In a Letter from Mr. MITCHILL *to* JONATHAN N. HAVENS, *Eſq. Repreſentative from the State of New-York in the Congreſs of the United States.*

YOU write me, in your letter from Shelter Iſland, of the 20th of July 1796, "that you have "been reading Saltonſtall's Diſſertation on Peſti"lential Fluids with attention, and that it has "raiſed your curioſity upon that ſubject." To gratify this further, you requeſt me to ſend you the publication I made about a year ago on contagion, as you have not yet read that performance. It is out of print, and I have for ſome time not known where to get a ſingle copy. As it may, however, one day fall into your hands, I ſhall, in my preſent anſwer to your late favour, conſider the ſubject in a manner different from any thing contained in that tract.

If I have not deceived myſelf, there are facts enough ſtated there and elſewhere, (my letter to Miller,) to ſhew that ſeptous and ſeptic vapours (combination of ſepton, or azote, with oxygene) iſſuing from organized ſubſtances, in certain ſtates of putreſcent decay, in the open air, riſe and contaminate the atmoſphere near the earth, and in the habitations of men; and, unleſs I am greatly miſtaken, there is a ſufficiency of facts to perſuade us, that ſimilar products are formed at times in the human ſtomach; when, on a ſuſpenſion of the concoctive proceſs, a load of *beef*, half tainted and half raw when eaten, corrupts in a Britiſh or American ſtomach, and cauſes gaſtritis and black-vomiting. I mention *beef particularly*, becauſe, in Rammazzini's account of the contagious epidemic which infected the neat cattle throughout almoſt the whole of the Venetian dominions in 1711, (Opera. Med. & Ph. p. 460.) we are informed, that, on ſome former occaſion, there took place diſputes between the butchers and inhabitants, both at Venice and Padua, about the quality of the beef brought to market. It ſeems, many of the people who ate the beef became ſick, and died of dyſentery. The blame of this was thrown upon the butchers, who were charged of buying up ſickly cattle in Hungary, and ſelling their diſtempered fleſh to the people. This matter being referred to the phyſicians, they gave an opinion in favour of the butchers. Whence it would ſeem that complaints of the unhealthy quality of this ſort of animal food are by no means new and unprecedented.

Peſtilential fluids, thus exhaling from the ſurface of the earth, may completely ſurround the human body, and be applied to the whole cuticular and pulmonary ſurface, as well as to the entire mouth and noſtrils: and the like productions, generated in the alimentary canal from corrupted food, may be ſpread all along the inteſtinal tube, ſo that the internal ſurface from the gullet to the anus, may be at times partially or entirely diſordered by them.

If ſuch noxious ſubſtances are applied, both externally and internally, to ſo large a ſurface, it might be expected they would have ſomething more than a local operation, and extend their influence beyond the mere part which they touched. Theſe exhalations acting *externally* in their ſtrong ſtate, may inſtantly kill, by ſtopping reſpiration; may cauſe, by their cauſtic quality, ulcers to form, bliſters to riſe, and mortifications to ſpread along the ſkin; and they may inflame the noſe, throat, and eyes, and cauſe pimples and ſpots of various ſhapes and hues to appear; or, by *internal* agency, ſimilar fluids may excite an erythematic or eryſipelatous inflammation in the ſtomach and inteſtines, inducing gaſtritis, diarrhœa, and dyſentery, with deſtruction of the lining of the guts, effuſion of blood from the corroded veſſels, and ulcerations, gangrene, and ſphacelus, from their cauſtic ſharpneſs. But theſe are not all the effects which ſuch deleterious fluids are capable of working on the living body. Can it poſſibly happen, that peſtilential fluids ſhall come in contact with the lungs, ſkin, and inteſtines, whoſe ſurfaces are thickly beſet with abſorbent veſſels, and that their noxious matters ſhall remain around the orifices of thoſe inhaling tubes for a very long time, and yet no atom or particle of them be taken in? Will not a portion of them be ſucked up by the lacteals from the inteſtines, and by the lymphatics from the other expoſed ſurfaces of the body, and through their channels be conveyed into the maſs of blood? Will not the blood, on receiving theſe foreign materials, aſſume new qualities, and, as it travels the round of circulation, carry with it the miſchief and venom to the brain and nervous ſyſtem? Let us examine theſe queſtions.

Firſt, let the appearances be obſerved which blood exhibits in the veſſels of thoſe who are dead of peſtilential diſtempers. The diſſections of this claſs, mentioned by Lieutaud, (which I ſhall take becauſe the book lies before me on the table,) are all declared to be attended with changes of the blood of a remarkable nature—blood taken away by veneſection being in a ſhort time liable to corrupt in *putrid* fevers (Precis de la Medicine, vol. i. p. 45.); in the hepatic veins of *ardent* fevers being black, and having a reſemblance to pitch (p. 56.); in *malignant* fevers ſometimes appearing to be in a ſtate of diſſolution, and at others very thick, and formed into polypus concretions (p. 70.); the heart and veſſels in the *plague* very much enlarged, and filled with black and grumous blood (p. 86.). In thoſe who die in the cold fit of *intermittent* fevers, the blood is black and thick, diſtending the lungs, heart, and large veſſels (p. 96.), the vena portæ being prodigiouſly diſtended.

Secondly, it will be next proper to ſee what are the effects of ſeptous and ſeptic airs, when injected, artificially, directly into the blood-veſſels of living animals.

Luzuriaga, one of the king of Spain's philoſophical penſioners, injected ſeptous gas (azotic air) into the jugular vein of a dog. The animal almoſt inſtantly expired; and on opening the thorax, the blood in both ventricles and auricles of the heart was found thick and dark-coloured, though leſs ſo in the left than the right; which latter was full of polypi: the vis inſita of the muſcles, and the irritability of the heart, were deſtroyed.

He alſo injected ſeptic gas (nitrous air) into the jugular vein of another dog: on examination after death, the blood in the auricles and ventricles was of a darkiſh purple, or blackiſh hue; polypi were found in the right cavities; and blood a ſhade or two lighter in the left. The irritability of the heart was very much diminiſhed, and the lungs conſiderably damaged by the air injected. (Tentamen Medicum, &c. Exp. 4 and 6.

Thirdly, there will likewiſe be a propriety in examining what changes ſeptic gas makes upon blood drawn out of the veſſels. *Arterious* blood (Ibid. Exp. 12.) running into a veſſel filled with ſeptic gas, quickly coagulated; a greeniſh coat formed upon the ſurface; the craſſamentum towards the bottom was dark-coloured and leſs green; the quantity of ſerum was ſmall and greeniſh. *Venous* blood, treated in like manner, exhibited a large quantity of dark-coloured ſerum, without any greenneſs.

From the compariſon of the blood in theſe diſſections with the blood treated with the ſeptous and ſeptic gaſes, it is evident there is in both caſes *a loſs of floridity*, an *acquiſition of a dark or black hue and ſpiſſitude, tending to the formation of grumes or polypi;* and as far as inquiry has been made, I think we are warranted in concluding, that ſuch changes in the blood take place more or leſs in *all diſtempers ſpringing from peſtilential miaſmata, or contagious vapours.* A queſtion, however, ariſes, whether the altered condition of blood in febrile diſorders is owing to the ſame cauſe which brought on a ſimilar ſtate of it in Luzuriaga's experiments? or rather, whether ſeptic (nitrous) compounds do not ſometimes inſinuate themſelves into the blood-veſſels, and bring on the above-recited ſtate of the vital fluids? I am inclined to think this is the caſe. And though I am far from believing that ſeptous and ſeptic compounds, in their proper form of gaſes, can, by any natural proceſs, get into the circulating ſyſtem of living animals, yet is appears to me highly probable, that the ſeptous and ſeptic acids may be occaſionally inhaled, in conjunction with other fluids, both by the lacteals and lymphatics, and thus enter into the ſanguiferous tubes.

I ſhall doubtleſs be conſidered a favorer of the humoral pathology, from my dwelling upon the morbid conditions of the fluids and humours. I own that I am. A faſhion has too long prevailed of referring every thing immediately to the ſolids; and this has been carried ſo far, that febrile diſeaſes in particular have been deemed original affections of the nervous ſyſtem. This doctrine of the nerves and ſolids has been carried a great deal too far by Cullen, Brown, Milman, and their followers, who, in their zeal for ſupporting *the vital excitement of the moving fibre*, have overlooked half the facts which appertain to the ſubject. This is ſo much the caſe, that there is a certain ſymptom occurring ſometimes in the courſe of malignant diſeaſes, and not noticed by either of thoſe writers, the true interpretation whereof affords a guiding light through the devious and obſcure region I have undertaken to explore.

1ſt. Among the tokens of putreſcent fever, as it occurs in the iſland of Jamaica, eſpecially when putreſcent tendency is communicated from the primæ viæ to the reſt of the body, there frequently comes on, towards the end of the diſtemper, an uncommonly fine and delicate bloom of the complexion (Jackſon's Treatiſe, p. 101.), while the edges of the tongue are clear and of a beautiful red in their colour, and the lips ſmooth and of a cherry-like appearance: when this beautiful blooming colour prevails, which is not natural to the patient, there is always reaſon to ſuſpect danger (p. 113.). It is preſumable that, in ſuch caſes, a highly-oxygenated ſeptic acid is formed in the alimentary canal, which is abſorbed by the lacteals with the chyle, and carried into the blood-veſſels, where, inſtead of attracting oxygene from the vital fluid, as ſeptic gas does, it will give out a portion of its own oxygene to the blood, and impart to it a remarkable and unuſual degree of redneſs. This property, which it poſſeſſes in common with vegetable and other acids, may thus heighten the colour of the blood, which at the ſame time, from its tendency to leſſen the living energy of the heart by exceſſive ſtimulation, may be very operative in undermining the animal fabric, which it thus deſtroys, while it beautifies. We have ſeen, in the experiments related, how *nitrous* (ſeptic) *gas* attracted oxygene from the blood. The ſame thing takes place when it meets with *vital air*. The two airs inſtantly combine, and a quantity of heat is evolved. The product of their union is *nitrous acid*, as De la Metherie himſelf allows (Eſſai Analytique ſur l'Air, &c. p. 376.). This author, who is no friend to the new Nomenclature, admits, however, with Thouvenel, that *nitrous acid* in the ſaltpetre works, is produced by the concourſe of pure air with *putrid* vapours. What then is putrid vapour but nitrous gas? Putrefaction *ſometimes* goes on among the inanimate animal contents of the alimentary canal. Putrid vapour then muſt be formed. If this be nitrous (ſeptic) gas, it will attract oxygene from the neighbouring ſubſtances, and be inſtantly converted to nitrous or nitric acid; and if this meet with no neutralizer in the bile or alkaline matter in the primæ viæ, it may inflame the ſtomach and inteſtines, be abſorbed, oxygenate the blood, &c. &c. I think further, ſome peſtilential matter vitiates the blood.

2d. Becauſe children born of mothers ſick with the plague have been known to bring with them from the womb evident marks of peſtilential infection (Ruſſel, p. 95.). The fetus can ſcarcely be ſuppoſed to have bred the diſtemper within itſelf; the matter of miſchief was therefore moſt probably received from the placental veſſels of the mother; although there is no direct communication of maternal and fetal tubes, ſtill the connection may be imagined intimate enough to allow ſomewhat of the taint of the mother's blood to paſs through to the child. Or, if this explanation be deemed unſatisfactory, there is only one other poſſible mode of explanation, and that is, through the medium of the liquor amnii, which muſt, in that caſe, have become contaminated with the peſtilential venom paſſing unchanged through the ſecretory organs. In either caſe the point I am looking at is clear, viz. that the blood of the mother has ſomething noxious in it.

3d. Becauſe, whether the maternal blood be enough vitiated to infect the fœtus or not, yet women, in whatever ſtage of pregnancy, when diſtempered with plague, ſeldom eſcape abortion, and many of them periſh, even when the loſs of blood from miſcarriage is not conſiderable (Ruſſel, p. 95.). As the lungs of the mother have to provide oxygenated blood for the conſtitution of her yet unbreathing child, as well as for her own, it is eaſy to conceive wherefore the dark-coloured, under-oxygenated, peſtiferious blood of the former ſhould be unable to reſtore the vital ſtimulus in due quantity to the effete and exhauſted blood of the latter: for want of this needful and exciting ingredient, the umbilical vein carries back to the young animal a maſs of blood quite ſluggiſh and inactive. The immature fetus of courſe dies, and drops from the uterus, like unripe vegetable fruit from its branch.

4th. Becauſe obſtructions and ſwellings of the *inguinal* and *axillary glands* often accompany a peſtilential condition of the air. The venom is, in all probability, imbibed by the abſorbents, and carried with their other contents into the maſs of blood. Buboes and glandular tumours thus occur only in comparatively a few caſes, when the peſtilential matter ſticks by the way, and cannot find its paſſage freely along the opening into the left ſubclavian vein. I cannot help thinking the tumors of theſe glands, in peſtilential caſes, are as fair evidence of the poiſon abſorbed, as in inſtances of an enlargement of ſimilar parts, after the abſorption of poiſonous matter into the fingers of diſſectors, from corrupting corpſes, &c.

5th. Becauſe, in abundance of inſtances, febrile maladies are followed by *meſenteric obſtructions*, which, I ſuppoſe, are cauſed by the abſorption of peſtilential matter, either ſwallowed or generated in the inteſtines from putrefied animal food, &c. as it may happen now and then that infectious matter, in flowing through the lacteals, may inflame the glands through which it paſſes, and excite in them tumor and its conſequences.

6th. Becauſe the quality of the blood in perſons dead of the complaints already enumerated, is different, in many reſpects, from that brought on by mere excluſion of vital air, as in breathing ſeptous and inflammable gaſes; leading thus to a perſuaſion, that, beſides the *withholding oxygene*, there had, in peſtilential diſeaſes, been actually an *addition of ſomething ſeptic* to the circulating maſs.

7th. Becauſe, in many diſtempers of the ſummer and autumn, the colour of the blood circulating through the ſkin, and the hue of the ſkin itſelf, are conſiderably altered; and in this change of the ſkin from the ordinary fleſh-colour to clay-coloured, duſky, yellow, purple, and black, there is ſomething of a peculiar caſt in peſtilential diſeaſes, that is not found to accompany any others: the complexion of perſons dying under water, and in fumes of burning charcoal, being in appearance, as well as in fact, conſiderably different.

8th. Moreover, I believe that peſtilential matter is ſometimes mingled with the circulating blood; becauſe, though it has not been concentrated enough to produce, *in all inſtances, diſeaſes*, when inſerted by inoculation in the body of a healthy perſon; yet there are not wanting facts to evince its virulent influence in ſome experiments that have been made. (Home's Exp. on the Meaſles, &c.)

Leſt this idea of the power of the abſorbents to imbibe ſuch fluids may appear to be merely ſpeculative, it may not be amiſs to mention the experiments of Maxwell (*Experiment. cum diverſ. Aërum ſpeciebus in Animalibus*, &c.), proving the thing to be really a fact. This gentleman, among various other experiments, produced artificial emphyſemata, by forcing atmoſpherical, phlogiſticated (ſeptous), dephlogiſticated (oxygenous), fixed (carbonic acid), inflammable (hydrogenous), and nitrous (ſeptic) airs into the cellular membrane of living dogs and rabbits. The reſult of numerous trials was, that elaſtic fluids ſo injected were very completely taken in by the lymphatics, though with different degrees of readineſs; that all the

airs,

airs, except *two*, produced by abſorption ſcarcely any obſervable effect upon the body; that theſe two were SEPTOUS and SEPTIC gaſes, the *former* of which would not deſtroy life until after ſome days, while the *latter* KILLED IMMEDIATELY. When the ſeptic gas was injected, it was ſo ſuddenly abſorbed, that death came on not by its inflammatory action upon the ſuperficial muſcles, but by its being mixed in a *certain quantity with the blood*, and after converſion to *ſeptous* or *ſeptic* (nitrous) *acid*, *by conjunction with oxygene in circulating through the lungs*, STIMULATING THE HEART TO DEATH, and utterly deſtroying *all* the irritability of that muſcle (p. 12. & ſeq.). The experimentor computes, from the facts which preſented themſelves during his inveſtigation, that this ſeptic poiſon may be abſorbed by the ſkin, and be conveyed to the heart in *about half a minute!* (p. 17.) Yet it muſt not be imagined that, after peſtilential venom is inhaled into the blood-veſſels, death will in all caſes be the conſequence. The offending matter may be carried from the body through the excretory outlets; or it may circulate a long time with the other fluids, and ſo *ſeaſon both the veſſels and the heart* to its action, that after a while *they*, like the *external parts*, will grow *inſenſible to its ſtimulus*, and *no longer have their motions diſturbed by it.*

You will obſerve that I reject altogether the notion of *putridity*, as it is *very generally ſuppoſed* to be going on in the blood-veſſels; and that I have no faith in the introduction of *putrid ferments* into the maſs of fluids. A putrefactive proceſs taking place in the contained parts of the living body, except among the contents of the alimentary canal, is incompatible with life more than a few minutes. Putrefaction is a reſolution of an organic body into its elimentary atoms, or into new compounds. Now, many of theſe are gaſes, whoſe extrication in the blood-veſſels would extinguiſh life in a very ſhort time. Beſides, the fluids produced by putrefaction, having already undergone that operation, cannot be any more ſuſceptible of it. They not only do not putrefy the muſcles, but, in the common acceptation of the term, they retard putrefaction in other ſubſtances. Thus *fixed air*, *nitrous acid*, and *volatile alkali*, which are reckoned among the moſt active *products of putrefaction*, are known to be ſome of the moſt *powerful oppoſers of it*. And it may be laid down as a pretty broad fact, that ſuch ſubſtances as are *ſeptic in their origin*, are *antiſeptic* in their effects; and this neceſſarily from the nature of things.

As to the *dark colour* of the blood drawn from the *veins*, in malignant diſeaſes, and the *diſſolved ſtate* in which it appears, I conſider them as having no manner of connexion with a putrefactive ferment within the veſſels. It is very well known, (Annales de Chimie, tom. v. p. 266.) that hydrogene gas, injected into the jugular vein, keeps the blood liquid, and imparts to it a colour almoſt as black as ink; and it is as well known, that the hydrogene gas obtained from animal ſubſtances contains a quantity of carbone in ſolution; ſo that *venous blood* owes its *dark hue*, and its diſpoſition to fluidity, to the commixture of a quantity of *carbonated hydrogene*. When vital air is freely admitted into the cheſt, and the lungs perform their functions well, the venous blood parts with its hydrogene and carbone, to form with the principle of acidity water and fixed air in the bronchia, and receives from the pulmonic cells a portion of oxygene in their ſtead. When therefore, by an impediment of the reſpiration, as in breathing peſtilential air, the hydrogene and carbone are imperfectly or not at all exhaled; and, at the ſame time, very little or no oxygene is abſorbed through the lungs, the *black* or *dark colour*, and *diſordered appearance* of the blood, and particularly the *venous*, follows as a thing of courſe. And whenever afterwards the peſtilential matter abſorbed is added to ſuch blood, the deviations of colour, conſiſtence and other qualities from the healthy ſtate, muſt be yet more conſiderable.

From a review of what has been ſtated in this letter, the probability of the following inferences will be apparent. 1. That the preſence of carbonated hydrogene, and the abſence of oxygene, will explain the common qualities of the venous blood. 2. That peſtilential matter may impart to it a further change of qualities. 3. That peſtilential matter does actually enter the maſs of blood. 4. That the lacteals and lymphatics carry it there. 5. That the appearances of the blood are very much alike in all peſtilential diſtempers, from agues to plagues. 6. That theſe phenomena are nearly analogous to thoſe induced by the injection of ſeptous and ſeptic gaſes into the blood-veſſels. 7. That from the ſimilarity of effects in the caſes when peſtilential matter was abſorbed, and where ſeptic fluids were injected, the two claſſes of phenomena are referable to the ſame general cauſe.—Your's very, &c.

SAMUEL L. MITCHILL.

New York, Auguſt 1, 1796.

Illuſtrations of Mr. MITCHILL's *Doctrine of the Operation of Peſtilential Fluids upon the Human Body. In a Letter to* SIMEON DE WITT, *Eſq. Surveyor-General of the United States.*

THE peruſal of your inſtructive letter, dated at Albany, June the 2d, 1796, on the ſubject of my pamphlet about peſtilential airs, which you are polite enough to call "an ingenious and valuable work," has given me much pleaſure. Availing yourſelf of the miſcibility of contagion and infection with water, you propoſe ſteam or the *vapour-bath* as an additional means of removing it, and deſcribe how the Indians apply and employ that remedy: I queſtion very much, however, whether in peſtilential complaints, occurring as they commonly do in North-America, in hot weather, it would unite ſo many good qualities as *clear cool water.* I do not remember that the *earth-bath* which you mention was ever medically preſcribed for perſons labouring under ſimilar diſtempers; though I remember a queer fellow in Europe who uſed to recommend it very ſeriouſly to his patients and the public, and to bury himſelf up to his neck as an example for them; he uſed to ſay the application of freſh earth was admirably calculated to invigorate the body by extracting the cauſes of diſeaſes, and to ſtrengthen the mind by operating as a *memento mori;* its ſimilitude to interment, I rather ſuſpect, would make it operate unfavorably upon terrified perſons, who think it is quite ſoon enough to be buried after they are dead. Such conſiderations as have occurred to me concerning ſome other matters mentioned in your letter, are contained in the papers which I read laſt winter before the Agricultural Society of New-York.

You expreſs your "full perſuaſion, that, under "certain combinations in our atmoſphere, gaſeous "fluids are the cauſes frequently of the worſt ma-"ladies that afflict us, whether received by the "abſorbing pores of the ſkin, by the lungs, or "by the bowels." In this ſentiment I fully agree with you. But as this concluſion ought to be admitted with ſome reſtriction, or requires certain explanatory conſiderations, I ſhall now preſent you with the reſult of my reflections on the limits by which their pernicious operation is circumſcribed.

When we ſpeak in common language of the unhealthy or deſtructive effects of contagious or infectious matter, we generally wiſh to be underſtood as referring to their operation on the bodies of thoſe to whom it is applied freſh, or who never felt its influence before. Thus, when it is affirmed the ſmall-pox is a dreadful diſtemper, the expreſſion is limited to thoſe who have not been ſeaſoned to its action; when it is aſſerted that the plague is very eaſily catched, the meaning is, by thoſe whoſe conſtitutions have always been wholly untouched by it; when it is declared the yellow fever cuts off multitudes of men in the tropical climates, the remark particularly refers to new-comers from the temperate zone, &c.

I have laid it down as a fact in my doctrine of fever, that the ſick get well in abundance of inſtances, leſs by the aid of the medicines they ſwallow, than becauſe the ſtimulus of infection wears itſelf out. The conſtitution in theſe caſes becomes ſo habituated to the venom, that this no longer makes a ſenſible or morbid impreſſion on it. After a ſervitude of greater or leſs duration or violence, it ſeems at length to get emancipated. By various degrees of indurance, it acquires a ſort of immunity from the old ſource of inquietude, and obtains a diſcharge as it were from further vexation on that ſcore. It ſomehow becomes enabled to live and be uſeful in times of diſtreſs and danger, with little or no moleſtation from the ordinary cauſe of miſchief. When peſtilence ſummons the multitude, ſuch perſons enjoy their privilege, and are in the nature of exempts from its mandate.

Thus it appears to me there is a whole claſs of animal maladies which leave the ſyſtem in a condition leſs liable than before to be incommoded anew by contagion or infection. Though I do not know that the human conſtitution can, *in any caſe*, acquire ſuch a degree of apathy or inirritability as to be wholly and always free from ſucceſſive attacks of theſe kinds of diſtempers, yet, in almoſt every one of them it experiences *ſomething of ſuch a tendency*. A citation of a few facts on this ſubject will at once elucidate the principle, and ſhew the analogy.

The ſmall-pox, when invading in the natural way, leaves the conſtitution ſo little liable to be troubled by it a ſecond time, that the art of inoculation has been contrived and practiſed, with the view to induce in the body, artificially, whenever it was thought proper, an inſenſibility to the further operation of that contagion. A like inſenſibility is brought on by the meaſles and varicella.

Syphylitic contagion, applied to the urethra, will frequently, after exciting a variety of uncomfortable ſymptoms there, loſe its power of ſtimulating any more, or wear itſelf out (Hunter on the Venereal Diſeaſe); ſuch perſons as have had it once being, under equal circumſtances, not ſo likely to take the contagion afreſh.

They who eſcaped the yellow fever which raged in Charleſton in South-Carolina in 1748, were far leſs likely than before to be attacked by it (Lining, Eſſay Phyſ. Lit. vol. ii. p. 374.); and on this immunity from the diſtemper, the writer expreſſes himſelf with great confidence. The ſame remark has pretty generally been made by men of experience and obſervation between the tropics.

Small animals, who have been kept for pneumatic experiments, and frequently made to breathe non-reſpirable airs, grow by degrees ſo far familiarized to their action as to ſuffer far leſs inconvenience and riſk than at firſt.

Priſoners in foul jails, like the natives of unhealthy countries, may become, by degrees, ſo accuſtomed to peſtilential air, that their conſtitutions will not be greatly diſordered by its preſence; while, at the ſame time, a perſon from a pure atmoſphere, ſuddenly introduced, may ſuffer violent diſeaſe, or be quite deſtroyed by it.

During a peſtilence which, in the former part of the eighteenth century, raged almoſt throughout Europe among the horned cattle, the German farmers would give almoſt any price for cows that had once had the diſeaſe, becauſe they were ſeldom or never ſeized again with the plague. (Van Swieten apud Boerhaav. § 587.)

If the perſon who is ſeized with a quartan, ſays Sydenham (Opera Univerſa. § 1. chap. 5. p. 49. 8vo. edit.), of whatever age or temperament he be, has been affected with a ſimilar malady in any other period of his life, no matter how remote, this ſecond invaſion of the diſeaſe will not incommode him much, but will ſpontaneouſly leave him after a few fits.

Although patients are apt, from irregularity in diet and regimen, to *relapſe* when in a ſtate of convaleſcence from the plague; yet P. Ruſſel declares, that re-infections were always regarded as remarkably uncommon (Treatiſe on the Plague, B. 2. p. 190.); inſomuch that out of four thouſand and four hundred peſtilential caſes, he met with only twenty-eight of re-infection, well aſcertained. And he affirms, that convaleſcents in plague are much leſs prone to *relapſe* than in other malignant contagious fevers (p. 305.).

In all the conditions of the body now enumerated, you ſee there is a near and ſtriking analogy; that is to ſay, by the application and continuance of any of the before-mentioned ſpecies of poiſon, the animal ſolids may be rendered ſo inſenſible of its action, as at laſt to be little incommoded by it, or ultimately to experience no inconvenience at all.

This unſuſceptibility, thus induced, is the τὸθεῖον of the ancients, the *divine ſomething*, which brings the conſtitution ſafe out of the diſeaſe. Regardleſs of preſcriptions and medical directions, the ſick will get the better of their indiſpoſition as ſoon as the peſtilential cauſe loſes its power of acting, and not ſooner. While this accommodating proceſs is going on, it is well known that fevers *cannot be cured*, and therefore the wiſeſt phyſicians have carefully avoided too much interference, and have left the patient very much to *nature*, as they expreſſed themſelves; meaning thereby, whenever the body grows inſenſible of the noxious ſtimulus the ſick would be reſtored to health, and not until then.

It ſtrikes me, this view of the ſubject enables us to comprehend the doctrine of what have been called CRITICAL DAYS. Theſe have given riſe to much diſpute, and conſiderable labor has been beſtowed to find out the true *judicatory periods*.

In a mild or equable climate, where the conſtitutions of the people, their ways of living, the air they move in, &c. are very ſimilar, it is conceivable that febrile paroxyſms ought to exhibit conſiderable regularity, and aſſume certain times of departure, as well as of approach; and that therefore, the tertian period of the third, fifth, ſeventh, ninth, and eleventh, may in common have been the natural order in Greece and the iſlands of the Archipelago; and when the diſorder was protracted beyond the eleventh day, the quartan period of the fourteenth, ſeventeenth, and twentieth, might have been the ordinary rule. The critical days become more diſtant and uncertain as the diſtemper is prolonged, until they are quite obliterated. The true meaning of the term *critical day*, then, is, not that the *αυτοκρατεία* excerns or drives off ſomething noxious that day, but ſimply, *that then the habit is eſtabliſhed of being no longer ſuſceptible of infectious ſtimulation.*

I can conceive likewiſe, that there may occur now and then, from ſpecial cauſes, an exception to this general rule, and that a diſtemper may terminate on the eighth, tenth, twelfth, fifteenth, ſixteenth, or any other day which is uſually *non-critical.*

In all infectious and contagious diſeaſes, there is a certain courſe, which they will run, notwithſtanding the adminiſtration of remedies; and when that courſe has been run, they may terminate without the aid of remedies. Does phyſic poſſeſs ſpecifics of power ſufficient to prevent the variolus matter from acting on the ſolids? No; the contagion of ſmall-pox ſtimulates until it can ſtimulate no more, and then the ſufferer recovers. In like manner the infection of peſtilence will attack the body, and continue its attacks until an inſenſibility to its action is brought on, and afterwards the ſickneſs will terminate. In both caſes, the prudent phyſician knows the moſt and beſt he can do is to *conduct the ſick in ſafety to the end of their malady.* None but the ignorant and preſumptuous will pretend to be able to cure them. When, therefore, Hippocrates and Sydenham proceeded moderately with their patients, they acted with a degree of ſenſe and conſideration infinitely ſuperior to thoſe idle calumniators who have lately found fault with ſuch feeble practice, and whoſe empirical raſhneſs has led them wholly aſtray from the true principle of proceeding. Under the impreſſion of ſuch ſentiments it probably was Lieutaud animadverted (Precis de la Medicine, p. 37.) upon the multiplicity of *remedies*, and Rammazzini lamented (De abuſu Chinæ Chinæ) the *miſchief done by Peruvian bark.*

The immunity which the conſtitution acquires under the varied forms of infection, will not in *all* caſes *be equally laſting;* nor in *any* will it amount to an abſolute ſecurity againſt a ſecond attack. The plague *may* make a ſecond onſet; the ſmall-pox has done the like. Such ſeems to be the operation of infected air.

However, if the principles herein-mentioned are right, a plain inference is, that there may exiſt a condition of body not merely able to eſcape infection, but capable of being actually benefited by its preſence.

It has accordingly been remarked, that perſons prone to conſumption were not ſo likely as others to ſuffer from the infection of plagues in the unhealthy parts of Europe and Aſia.

We are informed that the peſtilential rice-grounds of Georgia exhale an effluvium of ſuch a quality as to cauſe mortal remittents in the ſound, and at the ſame time affording ſignal relief to the phthyſical.

There can be little doubt, that one principal benefit done to pulmonic ailments, by voyages to the South, proceeds from the impregnation of the atmoſphere by infectious airs.

I hold it certain, there is always peſtilential gas in and around the habitations of men, though it but rarely becomes ſufficiently accumulated or concentrated to operate much in cool northern places. But the caſe is otherwiſe in the lower latitudes towards the equator, where it is common for ſo much non-reſpirable air to generate as to bring on the diſtreſſes of peſtilence, while it keeps off the ravages of conſumption.

It has been aſſerted that peſtilential maladies chiefly affected the lower claſſes of people and the indigent. This indeed is very much the caſe. But people in the higher walks of life, phyſicians, princes, prieſts, and noblemen, have frequently fallen victims to their violence. (*Bibliſche Ergetzlichkeiten*, § 947.) So that the wealthy and the great have by no means an entire exemption. See *Miſander*'s Uber. 2 Sam. xxiv.

But in ſeaſons of peſtilence, certain tribes of animals are exempted more completely than any deſcription of men, particularly many of the ſpecies of reptiles and inſects. It ſeems, that in the economy of nature, theſe, though many of them are breathing animals, do require an atmoſphere different from that which ſuits the conſtitution of mankind and quadrupeds. They are bred in the midſt of peſtilential air, and thrive beſt in it.

On conſidering the hiſtory of modern endemic diſtempers, and comparing it with the relations made in the eighth, ninth, and tenth chapters of Exodus, the plagues of Pharoah will be found to be very analogous, and to ſucceed each other in a very orderly progreſſion. They are almoſt all local, and ſuch as might be expected to happen in a valley of conſiderable width near floods of the Nile. The converſion of the river into blood will admit of the ſame explanation with ſuppoſed ſhowers of blood; and the rain there, in the opinion of an agreeable writer, (Pott. Eſſai ſur la Nature, &c. tom. i. ch. 8. p. 115.) may be coloured red during its deſcent by the duſt waſhed from certain inſects, by the preſence of microſcopical inſects themſelves, or by fluids emitted by the inſects; or after its fall it may acquire its ſanguine colour from oker or reddiſh earth brought down from the mountains. The exceſſive multiplication of *frogs*, *ticks* (lice), and all ſorts of *flies* (gnats and muſquitos) ſwarming about, ſtarving and dying upon the land, were ſufficient to contaminate the air, and generate peſtilence among domeſtic animals, and to cauſe ulcers and burning puſtules on the human ſpecies. I have endeavoured elſewhere to prove, that bitter cold in the atmoſphere is to be explained upon the ſame general cauſe which produces peſtilence. The occurrence there of hail and lightning (ſee my letter to Mr. *Valentin*) and ſubſequent darkneſs are all very natural, as well as the extraordinary production of graſshoppers (locuſts), and the mortality among the young Egyptians (Calmet ſur l'Exode, p. 65. & ſeq.). This coincidence of peſtilence and hail is very remarkable, and is ſtrictly conformable to philoſophical truth.

There is another inſtance of exemption which occurs to me, and that is of the white people of Nantucket and Martha's Vineyard, when ſuch ſad mortality prevailed among the Indians in 1763. The Indians alone ſuffered from it in theſe two iſlands. The account given of this peſtilence by Mr. Oliver, in his letter to Mr. Mauduit, is very ſhort and incomplete. From it, however, we learn, that the *Indians had been ſcanted in their allowance of corn*, which led them probably to the conſumption of a greater quantity of fiſh for food: in this way the diſtemper might have ariſen. We learn further, that the diſeaſe ſo produced was attended with *violent inflammatory fever, which carried them off in about five days*, reſembling, in theſe reſpects, the endemic diſorders of New-York and Philadelphia. And we learn further, that the *Indians chiefly lived and died by themſelves:* whence it would be not at all difficult of explanation, why the white inhabitants, who had better food and lived in diſtinct parts of the iſlands, altogether eſcaped.

As your official ſituation puts it in your power to collect information with great advantage from the weſtward, I have to requeſt you will aſcertain for me the effects which the air of thoſe nitre-grounds, mentioned by Mr. Secretary Pickering, in one of his reports, has upon animal bodies, and eſpecially upon human conſtitutions. In ſo doing you will aid the cauſe of ſcience, and greatly oblige your ſincere friend,

SAMUEL L. MITCHILL.

New-York, June 14, 1796.

SIMEON DE WITT, Eſq.

# EXTRACTS
FROM A
DISSERTATION,
SHEWING IN WHAT MANNER
PESTILENTIAL VAPOURS
Acquire their *acid* Quality, and how this is neutralized
and deſtroyed by
ALKALIES.

By ADOLPH C. LENT, M. D.

Facts tending to ſhew the Connection between the Effluvia of putrefying Bodies, and malignant and peſtilential Diſeaſes.

FROM marſh exhalations and human effluvia, has it been believed, from the earlieſt ages of phyſic to the preſent time, that malignant and peſtilential diſeaſes derived their origin. Daily experience ſtill confirms that it is in the neighbourhood of marſhes, and all ſuch places where vegetable and animal putrefaction takes place to any extent, that peſtilential and other diſeaſes of various grades and violence prevail. Epidemics, attended with carbuncles and buboes, which are denominated, in conjunction with the ordinary ſymptoms of what is called *jail* and *hoſpital* fever, the characteriſtics of the plague, down to the mildeſt intermittent, have appeared, and raged with extreme violence, occa-

ſioned

ſioned by the exhalations from putrefying animal and vegetable ſubſtances *.

The numerous facts and obſervations of the moſt judicious writers ſhew, that there are few climates where inſtances have not occurred of malignant epidemic and endemic diſeaſes, occaſioned by an atmoſphere ſurcharged and poiſoned with the effluvia exhaled from certain putrid vegetable and animal ſubſtances. Bengal, on both ſides the river Ganges, and Egypt, annually overflowed by the Nile, experience an unhealthy and peſtilential atmoſphere, immediately after the exhalations from the putrefying collections of vegetable and animal matter begin to ariſe in the air, and bring on diſeaſes of various grades of malignancy, down to what is called the plague. The ſame occurs in every climate in a greater or leſs extent. In ponds, ditches, ſwamps, &c. where, after the evaporation of the water, the collections of vegetable and animal matter being left bare, and expoſed to the influence of the ſun, begin to putrefy, and emit certain gaſeous exhalations, which transfuſe themſelves into the atmoſphere, and produce diſeaſes of an intermittent or more malignant type, proportionate to the concentrated ſtate of the contagion, and other concomitant circumſtances. Lind, whoſe teſtimony, from his experience, muſt equal moſt authors, relates abundance of inſtances where what is called *yellow fever*, and other malignant diſeaſes, were cauſed by gaſeous fluids exhaled from low and marſhy places, expoſed to the influence of a powerful ſun. He obſerves, that " in all ſpots in the Eaſt Indies, ſituated near large ſwamps, or the muddy banks of rivers, or the foul ſhores of the ſea, the vapours exhaling from putrid ſtagnated water, from the corrupted vegetable, and other impurities, produce mortal diſeaſes *." The ſame author more particularly mentions, that the *yellow fever* often raged at Greenwich Hoſpital in Jamaica, which, he obſerves, was built near a marſh, and could not proceed from any ſource of infection in the hoſpital. He every where attributes the *yellow fever* to the vapours ariſing from putrefying vegetable and animal ſubſtances.

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* Pringle on the Army; p. 321 and 322.

Dr. Clark, in his "Obſervations on the Diſeaſes of long Voyages to hot Countries †," mentions a *contagious malignant* fever, which prevailed at Prince's Iſland in 1771, produced from the exhalations of putrefying vegetable ſubſtances.

The plague which cauſed ſo great a terror and mortality in London in 1625 and 1636, according to the account given by Mr. Woodal, ſurgeon to St. Bartholomew's Hoſpital, and ſurgeon-general to the Eaſt-India Company, who was preſent thoſe two years during its prevalence, was evidently generated in that city from the gaſeous exhalations of putrid collections of animal and vegetable matter. He ſays, "the terreſtrial cauſes (after mentioning it as a puniſhment inflicted on mankind for their ſins) are, by common conſent of moſt writers, as followeth; venomous and ſtinking vapours, ariſing from ſtanding ponds, or pools, ditches, lakes, dunghills, ſinks, channels, vaults, or the like; as alſo unclean ſlaughter-houſes of beaſts, dead carcaſes of men, as in time of war, and of ſtinking fiſh, fowl, or any thing that hath contained life and is putrid; as alſo, more particularly in great cities, as in London, the unclean keeping of houſes, lanes, alleys, and ſtreets: from thoſe recited, and the like infectious venomous vapours, by warmth of the ſun exhaled, are apt and able to infect the living bodies of men, and thereby to produce the plague, as experience too much ſheweth *." From the deſcription given by Mead †, of Grand Cairo, the ſuppoſed harbinger of a ſpecies of the worſt type of diſeaſe, the plague, it will appear to be produced by ſimilar cauſes with the above caſe, viz. by certain gaſes formed on the putrefaction of vegetable and animal ſubſtances, and ſuffered to ariſe into and poiſon the circumambient atmoſphere with their noxious and ſtimulating qualities. He ſays, "It is ſituated in a ſandy plain, at the foot of a mountain, which, by keeping off the winds that would refreſh the air, makes the heat very ſtifling. Through the midſt of it paſſes a canal, which is filled with water during the overflowing of the Nile, and, after the river is decreaſed, it gradually dries up. Into this canal the people throw all kinds of filth, carrion, &c. ſo that the ſtench ariſing from it and the mud together is inſufferable. In this ſituation of things, the plague every year conſtantly preys upon the inhabitants, and is only ſtopped when the Nile, by overflowing, waſhes away the load of filth."

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* Lind on Hot Climates, p. 85.

† Vol. i. p. 123 and 124.

Pringle, Jackſon, Hume, and a number of other authors, might be added in further proof, that the effluvia from animal and vegetable putrefaction may give riſe to, and are the common cauſes of malignant and peſtilential diſeaſes. Inſtances, abundantly numerous, occur in our own territory,

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[*] Monro on the Army, vol. i. note to p. 223.

[†] On the Plague, p. 29 and 30.

to confirm the noxious and peſtilential influence of the products juſt named, on their application to the conſtitution, notwithſtanding the (ſo named) *facts*, which were promiſed *ſpeedily to appear* almoſt a year ſince, in contradiction of this opinion. It is related by Dr. Reynolds *, that from the putrefaction of a horſe, which lay on the borders of a marſhy piece of ground, a young woman who lived near, and was obliged frequently to paſs and repaſs the putrid carcaſe, was affected with violent pains in the head, and ſickneſs at her ſtomach. On the ſecond day of attack ſhe was bled; but her fever increaſed, and ſhe became delirious. A number of bliſters, ſurrounded by inflammation, appeared upon her feet and hands, fingers and toes; and ſhe died the fourth day.

A caſe a few years ſince occurred in this city, where a ſevere attack of fever, of the remittent type, attended with petechiæ, made its appearance in two perſons of the ſame family. On examination into the cauſe of theſe complaints, it was diſcovered, by the attending phyſician, to have originated from the blood and other offal of cattle, ſlaughtered in the yard belonging to the houſe, which was ſuffered to collect and putrefy; to the exhalations of which the two perſons attacked had been, from time to time, expoſed. An inſtance of a ſimilar nature, which occurred to a practitioner of a neighbouring town, is related by Mr. Bayley, in his treatiſe on the epidemic of New York, in 1795 †. "Some time in the month of September I was called to viſit a young man about eighteen years old, in a family in the ſkirt of the (Hartford) town. He was violently attacked with moſt of the characteriſtic ſymptoms of yellow fever, &c. The next day a ſecond was taken in the ſame manner; and, on the morning of the third, three more were taken ſick. This led me to ſuſpect ſome particular cauſe. I ſearched for it in vain that time. The next morning, on paſſing through the kitchen, I ſmelt ſomething that was very offenſive, which none of the family had noticed. On opening the cellar-door, I found that it proceeded from the cellar. Two perſons went down to examine, and found, in one corner of a ſmall tight room, a quantity of June cabbages, on which the ſun had ſhone about three hours in a day. They had rotted, and ſunk down in a lump of putrefaction. They run a ſtick under them, and lifted them up, and there immediately iſſued ſuch an intolerable ſtench, as obliged them inſtantly to leave the cellar. A vomiting was brought on at once, which laſted them nearly an hour. Notwithſtanding that the doors and windows of the cellar were thrown open, it was two days before they could clear it out. No other perſon in the family was taken afterwards, and thoſe who were already ſeized ſoon recovered."

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* Webſter's Collection, p. 197. † P. 84 & ſeq.

The malignant epidemic, or yellow fever, which prevailed in the ſummer of 1797 in Providence, Rhode Iſland; in 1795, in Norfolk, Virginia *; and in 1791 in New York; evidently took their origin from gaſes exhaled from vegetable and animal ſubſtances, ſuffered to collect and putrefy, on expoſure to a heated atmoſphere. It would be endleſs and unneceſſary to add facts in further confirmation of the noxious and deleterious qualities of certain gaſes, formed from vegetable and

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* Webſter's Collection, p. 148 & ſeq.

animal putrefaction, on its application to the conſtitution. Thoſe already related, as well as various other inſtances, ſufficiently confirm, that the greateſt degree of vitiation which the atmoſphere manifeſts by its operation upon the conſtitution, proceeds from the effluvia emitted from certain vegetable and animal ſubſtances during putrefaction. And as far as the innumerable facts on this ſubject have been collected and examined, there exiſts the moſt cogent evidence, that the products juſt named form infection, or contagion, marſh-miaſmata, or human effluvia, or whatever other name has been affixed to it. What the preciſe nature of theſe exhalations, or cauſe of fevers, was, and which the particular noxious gas, though long a ſubject of inquiry, remained unknown, till within a few years, ſince Mitchill, Profeſſor of Chemiſtry, Natural Hiſtory, and Agriculture, &c. in Columbia College, engaged in an inveſtigation of its properties, made known to the world what that poiſonous ſomething, which is formed during animal and certain vegetable putrefaction, was. He diſcovered it to be a portion of ſepton (azote), one of the elements of the body undergoing putrefaction, united chemically with more or leſs of oxygene (the acidifying principle), in the form of ſeptic (nitric) oxyd and acid *. On the formation and preſence of this compound, it is preſumed, do peſtilential and other malignant diſeaſes depend. And in proportion as a greater or leſs quantity of the above compound is formed; in proportion to its ſparſe or concentrated ſtate; in proportion to the length of time, the ſuſceptibility of the conſtitution to be operated upon, and the circumſtances

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* *Vide* Mitchill on Contagion.

under which it is applied; will the diſeaſes, depending upon this cauſe, be more or leſs violent, and attended with various peſtilential ſymptoms.

Inquiry into the Hiſtory, Production, and Qualities, of that Acid which attends the Putrefaction of ſuch Bodies as give riſe to malignant and peſtilential Diſeaſes.

SEPTON, the baſe of the acid of putrefaction, or ſeptic acid, is one of the moſt abundant elements in nature: it has not hitherto been ſubjected to any examination by itſelf, as no experiments have been able to detect it in a diſtinct and ſeparate ſtate. In combination with caloric (the matter of heat), it forms ſeptous (azotic) gas, which compoſes nearly three fourths of our atmoſphere, and is the ſame ſpecies of air which living plants are ſuppoſed to exhale in the night, according to Ingenhouz [*]. It likewiſe conſtitutes one of the elementary principles of certain plants; and, from the reſult of certain experiments made by Eagleton Smith, eſq. appears to be one of the elements which compoſe animal poiſons, as was, ſome time previous to this, preſumed by Profeſſor Mitchill. From the ſimilar action on animals, of ſuch animal poiſons as were uſed by the experimentor, ſuch as that of bees, ants, and ſome other inſects, with the decoction of the poiſonous plants, laurel, tobacco, digitalis, opium, &c. it appears highly probable, that their deleterious qualities are owing to a modification of this ſame principle, viz. ſepton. It alſo enters largely into the compoſition of the muſcular fibre, blood, and lean parts of animals, in combination with carbone, hydrogene, and phoſphorus, which are united together by a certain portion of oxygene, forming animal oxyds and acids, in proportion to the degree of oxygenation. This gas, in its pure and diſtinct form, is incapable to ſupport reſpiration and combuſtion, while it ſuſtains the life of plants, which appear to poſſeſs the power of decompounding it, and to attach to themſelves the ſepton, which enters into and conſtitutes one of their principles *. This principle or element is alſo capable of uniting with oxygene, the principle of acidity, forming with it, in proportion to the quantity of this laſt ſubſtance, 1. The gaſeous oxyd of ſepton (dephlogiſtated nitrous air); 2. Septic (nitrous) gas; 3 and 4, Septous and ſeptic (nitrous and nitric) acids; and 5, Septic acid gas.

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[*] Experiences ſur, &c. vol. ii. ſect. 7.

1. In the firſt of theſe forms, that of the gaſeous oxyd, in which the acidifying principle is ſo ſmall as not to manifeſt the ſmalleſt degree of acidity, it is capable of ſupporting combuſtion, but is highly deleterious to the lives of animals, which it deſtroys the moment they are ſurrounded by an atmoſphere of this kind †. 2 and 3, The next degree of combination of oxygene with ſepton, is the ſeptic gas, and the ſeptous acid. Theſe are artificial productions, and never found to exiſt in the atmoſphere for any conſiderable length of time, as their exiſtence depends on being kept cloſed, and free from contact with the air. The rapidity with which

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* Mitchill on Manures. Med. Repoſ. vol. i. No. 1.

† Prieſtley on Air, vol. ii. p. 35.

they abſorb oxygene from the atmoſphere, on expoſure, is ſo great as to become quickly ſaturated with this principle, and turn to ſeptic acid. As their exiſtence in the air is only momentary, unleſs kept from coming in contact with it, they can have no material influence on man or brute animals; and their qualities are ſo widely different from thoſe of the more highly oxygenated form, the experiments and concluſions drawn from the two former cannot apply to account for the phenomena of the latter. 4 and 5, The ſeptic acid, which is ſtill higher doſed with oxygene, and the ſeptic acid gas, the higheſt degree of oxygenation of ſepton, the form in which theſe compounds moſt commonly exiſt, and which are produced wherever ſepton and oxygene come into chemical union, have, for a length of time, been conſidered of *mineral* origin, and claſſed among the acids of this kingdom. How far this opinion is founded in experience, and deduced from facts, will appear on examination of the materials and ſources whence it is derived. It is well known that nitre conſiſts of ſeptic acid joined to pot-aſh, and is uſually formed during the decay of animal and ſuch vegetable bodies as contain ſepton. And it is aſcertained, that ſepton and oxygene enter into the compoſition of thoſe ſubſtances, when alive, and have gone into new combinations, on their diſengagement after death. One of theſe recent compounds muſt be ſeptous and ſeptic acid, conſtituting, by junction with a ſaline baſe, the ſeptite of pot-aſh. The theory of ſaltpetre thus neceſſarily preſumes the generation of ſeptous and ſeptic acid, from two of the elements diſengaged from organic texture: and as ſepton, the radical of the acid, is eſpecially abundant in animal bodies, there is little difficulty in comprehending both how, in ſuch circumſtances, it attracts the acidifying principle, and afterwards attaches itſelf to the alkali. Nicholſon obſerves it to be well known, that the ſeptous acid, inſtead of exiſting in the mineral kingdom, is almoſt always produced by a concurrence of circumſtances, chiefly conſiſting in the expoſure of putrefying ſubſtances to the atmoſphere; and that it is formed by the union of two principles, which are always found in atmoſpheric air, and the exhalations of putrefying ſubſtances *. The nitrous quality of the earths at the bottom of graves, in which animal diſorganiſation has taken place, is further teſtimony of the origin of this acid, as in this caſe it could not have acquired its ſeptic quality from any other ſource. Hence may be underſtood how other earths, ſuch as thoſe of ſtables, cow-houſes, cellars, vaults, drains, ſinks, &c. &c. acquire their nitrous quality. During the putrefactive proceſs of ſuch vegetable bodies as contain ſepton, and animal matter, which abounds in this principle, the oxygene derived either from the corrupting bodies themſelves, from the water in or near them, or from the atmoſphere, unites with this principle, and forms the ſeptic acid, which, being taken up by theſe earths, converts them into nitrous ſoils.

In further confirmation of the origin of this acid, may be added the authority of Fourcroi, who ſays, "It is no longer to be doubted that the ſaltpetre, which forms itſelf under our eyes, in ſoils ſoaked by vegetable and animal juices, or in ſtones impregnated with the ſame juices, or their vapour, (the materials which compoſe the floors and walls of our ſtables, vaults, &c.) repreſent, in this reſpect, real artificial nitre-beds †."

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* Nicholſon's Chemiſtry, p. 32.

† *Vide* Med. Repoſ. vol. i. No. 1. p. 71.

This acid is alſo found to exiſt occaſionally in the atmoſphere. The experiments of Margraff [†] on ſnow and rain-water, and Bergman's analyſis of waters, prove its preſence in the air, whence they are precipitated by theſe bodies, and mix with them in their deſcent. The nitrous quality of the calcareous matter of old walls, which takes place to ſuch an extent as to be converted to economical purpoſes, affords like proof of its preſence in the atmoſphere.

The baſes of the two gaſes, ſepton and oxygene, which compoſe this acid, conſtitute likewiſe our atmoſphere, but in different proportions and combinations. The ſeptic acid is found to contain four parts of oxygene and one of ſepton, chemically united; while the proportion of theſe ingredients in atmoſpheric air about the mean ratio, are 27 of the former to 73 of the latter; not, however, chemically united, but only diffuſed through each other, as clay is diffuſed through water, or as motes are ſeen paſſing through ſun-beams. Theſe gaſeous components of the atmoſphere are intimately blended, and mixed together, but do not loſe their attraction for caloric, by which they are continued in this ſtate, and for which, in ordinary circumſtances, they have a greater affinity ſeparately than for each other. It is by virtue of this attraction for the matter of heat, that they are each kept in a ſtate of gas, and not ſuffered to unite, and form ſeptic acid, and thereby deſtroy the reſpirability of the atmoſphere.

Dr. Beddoes remarks, that " the nice balance of attraction between the conſtituent parts of the atmoſphere deſerves notice. Theſe two ſubſtances, when cloſely united, form nitrous (ſeptous) acid; if, therefore, they were not, by ſome circumſtances, prevented from uniting cloſely, all the oxygene, with part of the azote (ſepton), would be changed into a highly concentrated acid, and the waters of our globe would be converted into aquafortis" (ſeptous acid)*. Fourcroi alſo obſerves, "that this (ſeptic) acid is compoſed of the ſame elements with atmoſpheric air, only under a different form, and in different proportions, from thoſe which conſtitute the atmoſphere. Theſe facts are indiſputably eſtabliſhed by experiments in which the nitric (ſeptic) acid is decompoſed, and again produced by the union of the original elements. Hence it is demonſtrated, that it conſiſts of four parts of oxygene, and one of azote (ſepton). But theſe two principles, as contributing to the formation of the atmoſphere, are in the proportion of a little more than two parts and one half of the firſt, and one of the ſecond, and exiſt in an uncombined ſtate, ſeparately diſſolved in a common menſtruum, and without the poſſibility of contracting a real chemical union. Hence it ariſes, that atmoſpheric air is never ſpontaneouſly converted into nitric (ſeptic) acid†."

[†] *Vide* Watſon's Chem. Eſſays, vol. ii. p. 79.

The formation of ſeptic acid in the atmoſphere ſeems, however, to take place under certain circumſtances; as when the two conſtituent elements of the acid are brought into cloſe union, and within the ſphere of each other's attraction, by ſome violent concuſſions, ſuch as lightning in thunder-ſtorms. The experiments made by Mr. Cavendiſh *, who, by paſſing the electric ſpark through a portion of oxygenous and ſeptous (azotic) gaſes, obtained this acid, further tends to corroborate this opinion, and leads, at leaſt, to a belief, that this proceſs, to a larger amount, is conſtantly taking place in the upper regions of our atmoſphere, by the intervention of the electric matter.

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* Conſiderations on the Medicinal Uſe, and on the Productions, of Factitious Airs, p. 18.

† Vide Med. Repoſ. vol. i. No. 1. p. 68 and 69.

Action of this Acid and its Oxyds upon Timber, Metals, Earths, alkaline Salts, and Water.

THE ſeptic acid having been ſhewn, in the preceding pages, to owe its origin to animal and vegetable decompoſition, its operation on timber, metals, &c. will next be conſidered.

Facts, ſufficiently numerous, prove that this acid, generated by putrefaction, is always on or near the ſurface of the earth, and thence, when exiſting in any conſiderable quantity, pervades the atmoſphere, and, on meeting with certain bodies, unites with them, and becomes fixed or decompounded. If, in its vaporific form, it meets with the woody portion of dwellings, around and in which it is more or leſs plentifully evolved, more eſpecially the unclean, there can be no doubt but a quantity of this acid is imbibed, as all theſe materials are porous in a greater or leſs degree. There are no direct experiments, however, which prove that there exiſts a chemical union between the acid and it; but, from the readineſs with which wood is penetrated by water, and the known union which this latter body poſſeſſes for contagion, it muſt not unfrequently be conveyed in this manner, and combined with the timber of human habitations, where theſe gaſeous vapours, extricated during vegetable and animal putrefaction, abound: the quantity taken up will, in all probability, be proportionate to the poroſity of their texture; and in this ratio may the different kinds of wood be capable of imbibing the acid. The rapid decay and rotting of the timber of ſuch veſſels as carry wheat, is further teſtimony of the union and deſtructive operation of this acid, on its application to wood. The manner in which this proceſs takes place, appears to be owing to the grain falling through the flooring of the veſſel, where, on mixing with the water there commonly preſent, it putrefies.

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* Chaptal's Chem. vol. i. p. 219.

Wheat, containing the principle of putrefaction in no ſmall quantity, has, during its diſſolution, this principle, united with a ſufficiency of the oxygene, ſupplied either by the water, or what it itſelf contained, to form the ſeptic acid, which, ſpreading itſelf, attaches and unites with the timber, cauſing it to rot and decay, more or leſs rapidly, in proportion to the ſtrength and activity which the acid attains.

From this diſpoſition of the acid of putrefaction to combine and unite with the woody portions of dwellings, ſhips, or whatever elſe it comes in contact with, may it happen, that the noxious matter, ſaid, in ſome veſſels, to infect each ſucceſſive crew, derives its poiſon.

2. The operation of the ſeptic acid, as above obſerved, in rotting and breaking down the timber of

veſſels, has been noticed to ruſt and corrode, proportionally quick, ſuch iron ſpikes and nails as were expoſed, in a ſimilar manner, to the ſame cauſe; and, from its corroſive qualities, gradually deſtroys and wears them away, if preſent in ſufficient quantity, till nothing but ruſt is left remaining. Such inſtances as have been collected and examined on this ſubject, go to prove this operation of the acid on metals. It has been obſerved, that in the Weſt-India Iſlands, where putrefaction goes on rapidly, ſuch iron cannon as were expoſed to the atmoſphere, commonly ſurcharged more or leſs with this acid, ruſted much ſooner than thoſe which had been buried in the ſand in ſalt water. The teſtimony of Van Swieten alſo corroborates the activity and deſtructive influence of this acid on metallic bodies. He mentions, that at Oczakow, during the plague, "the inſtruments made uſe of by the ſurgeons turned as black and livid as if they had been dipped in aqua-fortis," (ſeptous acid); and "the ſilver hilt of a ſword, which, all the time of the plague, hung up in a tent, was changed quite black."

3. The action of this acid, in reſpect to earths, is more obſerved, and takes place to a larger extent. It readily unites with calcareous earth (lime), whenever they come within chemical attraction, in the form of a ſeptite of the ſame, (calcareous nitre,) as appears from the nitrous quality of old walls of privies, ſinks, drains, &c. Grounds frequently trodden by cattle, and impregnated with their excrements, the walls of ſlaughter-houſes, and the like, where exhalations from putrid animal and vegetable ſubſtances abound, as well as the formation of nitrous earths at the bottom of graves in which animal bodies have decayed, puts it be-

yond diſpute, that theſe earths have an attraction for and unite with this acid. This affinity between the acid of putrefaction and lime, takes place to a greater or leſs extent in every habitation, more eſpecially in large and crowded cities, where the ſtricteſt attention is not paid to remove all filth, and putrefying animal and vegetable materials. It was ſo well known, as to become an object worthy the attention of a body corporate in Paris, who obtained licence to take away as much of the old mortar of the walls of houſes, torn down, as they pleaſed, for the expreſs purpoſe of making nitre. Hence may be learned the quantities of ſeptic poiſon that is preſent, and floats about the habitations of man, gradually undermining his conſtitution, and cauſing malignant diſeaſes, if not taken out of circulation, and combined with ſome ſubſtance.

4. This acid likewiſe, on meeting with the carbonates of alkaline ſalts, decompoſes them, by deſtroying the chemical affinity ſubſiſting between them and the weaker acids; while, at the ſame time, it attaches to itſelf the alkaline baſis, forming with it a ſeptite of the ſame. The facts which have been already quoted put it beyond doubt, that the acid of putrefaction readily unites with pot-aſh, ſoda, and ammonia, reſpectively, in the form of ſeptites, wherever they come within the ſphere of each other's attraction: and, if it be evident that theſe bodies enter into combination, there will be no difficulty to ſhew, that this acid likewiſe unites with ſuch ſalts as have an alkali for their baſe. According to Bergman's tables of elective attractions, the ſeptic (nitric) acid has a greater affinity for pot-aſh than for any other alkali; and that no acid but the ſulphuric will diſſolve their

union *. On coming, therefore, in contact with ſuch ſalts as have this alkali for their baſis, it will decompoſe them, and, from its ſuperior affinity for this latter ſubſtance, combine with it in the form of a ſeptite of pot-aſh. In the ſame manner will thoſe ſalts, having ſoda and ammonia for their baſis, be operated upon by this acid.

5. The preſence of this acid in water, and its ready and entire miſcibility with this body, is evident from the experiments made, with the utmoſt diligence and attention, by Bergman and other chemiſts, on rain and ſnow-water. The teſtimony of Lewis is further confirmation of this union between the two bodies. He obſerves, that "common waters, both atmoſpherical and ſubterraneous, contain a little of this acid in combination with it †;" and that among the ſubſtances commonly found in waters, is the "nitrous (ſeptous) acid, combined with an alkali into nitre, or with ſome of the ſoluble earths into nitrous ſalts ‡." "The pureſt of the common waters is that of ſnow; and the ſaline matter of this kind of water is commonly of the nitrous kind, compoſed of the acid of nitre (ſeptic acid), united with calcareous earth."

It is agreed upon by almoſt all obſervers, that the vapours from ſtagnant waters do ſeldom occa-

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* Although the ſeptic acid does not poſſeſs an attraction for either of the alkalies, in ſo eminent a degree as the ſulphuric, according to Bergman's tables of elective attractions, yet, from his note, it appears it is capable to diſengage the ſulphuric acid, in ſome caſes, partially, from its connection with alkalies, though not ſo rapid and entirely as either of the other acids.

† Materia Medica, vol. ii. p. 120.

‡ Vol. i. p. 118.

ſion much miſchief, as long as the mud and ſlime remain covered. The reaſon of this is obviouſly owing to the mud, while covered by the water, emitting its poiſon but ſlowly, which, as it ariſes to the ſurface, mixes with the incumbent water, and remains united with it, ſo that little or none eſcapes to taint the atmoſphere. But at length, as evaporation goes on, and the water is nearly evaporated, theſe fluids, rarefied by heat, and becoming volatile, aſcend into the atmoſphere, and taint it with their noxious qualities, to the detriment of man and brute animals, who live and move in it. On this miſcibility of ſeptic, or acid of putrefaction, with water, no doubt, does it happen, that ſhowers of rain, as obſerved by almoſt every writer on the diſeaſes of hot climates, poſſeſs ſuch beneficial and ſalutary effects. The rain, in its deſcent, meets with this acid, unites with it, and thus precipitates it again to the earth, leaving the atmoſphere in a ſtate freed from its poiſon. In the ſame manner may dews and fogs, in their deſcent, unite with this acid vapour; and to the gradual and ſlow precipitation of water from the air, falling through this infectious fluid, and carrying a portion of contagion along with it, does it happen, that the crews of veſſels, ſent on ſhore, and ſleeping on or near the ſurface of the earth, in the open air, in ſuch places where theſe peſtilential vapours abound, are ſo commonly ſeized with diſeaſes which deſtroy their lives. The natives of the Eaſt Indies are ſo well aware of the noxious qualities, at times, of rain water, which falls firſt in ſhowers, that they are cautious how they expoſe themſelves to it. As evidence of this atmoſpherical water containing ſomething deleterious, it has been known to cauſe ſoal-leather to become mouldy and rotten in the ſpace of forty-eight hours. The ſame was alſo obſerved to happen in our own city, in the time of the epidemic in 1795. Hunter alſo remarks, that expoſure to rain is believed to be the cauſe of fevers in the iſland of Jamaica. The practice among Europeans at Conſtantinople, Grand Cairo, and other places where the plague rages, to cleanſe all their goods, &c. they receive by means of water, is further corroboration that peſtilential gas unites with water, inſomuch that theſe bodies, thus cleanſed, are deprived of communicating any poiſon they had previouſly imbibed. To this miſcibility of contagious fluids with water, may cold bathing, in malignant diſeaſes, owe its beneficial and ſalutary effects—the poiſon which adhered to the ſkin and its pores being thereby conveyed off, and rendered harmleſs to the conſtitution.

From the preceding facts then, it may be concluded, that the ſeptic acid, generated in all filthy and unclean dwellings, ſinks, &c. on meeting with either of the ſubſtances above enumerated, unites with them, becomes fixed or decompounded, and is thus taken out of circulation. By this wiſe proviſion of Nature, the acid of putrefaction, which muſt be formed in no ſmall quantity, conſidering the immenſe and incalculable maſs of vegetable and animal matter which is continually undergoing diſorganization, is arreſted and reſtrained from aſſuming its corroſive, ſtimulant, and poiſonous qualities, which it exerts on man and brute animals, when ſet looſe in the atmoſphere.

Effects produced by it upon the Conſtitution of Men, particularly the Mouth, Throat, Alimentary Canal, exterior and pulmonic Surface, Heart, Blood-Veſſels, and Lymphatic Syſtem.

Having aſcertained, as it is hoped, the cauſe of moſt endemic and epidemic diſeaſes, the ſources of their origin and formation, together with their affinities and action on different bodies; their effects on the living conſtitution ſhall next be conſidered.

1 and 2.—The effects of oxyds and acids of this ſort, when applied to the living body, which, in ſome inſtances, may be completely ſurrounded by an atmoſphere highly charged with theſe gaſeous fluids, are inflammations or ulcerations, together with many other diſeaſes of different kinds; and, if inſpired in a concentrated ſtate, may cauſe inſtantaneous death. On its application to the fauces and throat, from its cauſtic and corroding nature, it may inflame, and excite heat and diſtreſſing pain in the ſurrounding parts, and bring on apthæ, and erythematic affections of the pharynx and œſophagus, as is obſerved to happen under certain circumſtances, where it is generated or preſent, from any other cauſe, in ſufficient quantity. The experiments of Profeſſor Mitchill *, in his courſe of lectures in 1796, on the tartar of the teeth, ſhews that this acid may be (and is occaſionally preſent in the mouth) either formed from the remains of corrupt-

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* *Vide* Mitchill's Letter to Thomas Charles Hope, M. D. in the New York Mag. for February 1797.

ing food, or taken in by inſpiration with atmoſpheric air. This operation and effect, produced by the acid and its oxyd on the fauces and throat, is further confirmed by facts of diſeaſes of theſe parts, induced by breathing air highly vitiated with peſtilential effluvia. To this effect is the obſervation of Huxham, who remarks, that "for many months paſt we had ſcarce the ſlighteſt fever, but it was attended with ſore-throat, apthæ, and ſome kind of cuticular eruption, and that too in pleuritic and pneumonic diſorders; ſo greatly did the conſtitution of the air, &c. ſeem diſpoſed to produce eruptions in all ſorts of feveriſh indiſpoſitions *."

Robertſon, in his remarks on the Monthly Review of the ſick in July and May, alſo obſerves, that to the claſs of fever, the dyſenteric belly-ache, and almoſt all the cough and ſore-throat caſes, ſhould be added, becauſe they originated, I had nearly ſaid, from the ſame ſource; theſe different appearances depending on the habits or conſtitutions of the ſubjects infected †."

In the peſtilential fever which prevailed at Wincheſter Hoſpital, many were ſeized with uneaſineſs of ſwallowing, and complained of a ſoreneſs of the throat ‡. To this may be added the authority of Chiſholm, who, in his account of an epidemic fever in Grenada, remarks, among other obſervations, that "ſome complained of a rawneſs, as it were, from the throat to the ſtomach;" or, as they expreſſed it, "a rawneſs and burning of their inwards §."

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* On Fevers, p. 274. † On Jail Fevers, p. 325.

‡ Smyth on Jail Fever, p. 12.

§ Med. Com. for 1792, p. 267.

Hence then it will appear, that this volatile acid does occaſionally enter the fauces, and extends its influence to the œſophagus, cauſing a greater or leſs degree of inflammation and uneaſineſs in the parts, according as the poiſon is in a more or leſs concentrated form, and to the length of time it is applied. The mucus which lubricates the parts, and is continually excreted in conſiderable quantities, more eſpecially on the introduction of any extraneous body, may, in all probability, defend them from more repeated attacks of this acid, by uniting with and preventing its coming in contact with the parts.

3. The operation of this acid on the ſtomach and inteſtines appears more frequent than the above, and is productive of greater evils and fatality to the conſtitution. It may be either taken into the ſtomach by mixing with the ſaliva, and ſwallowed, or may be generated in the inteſtinal canal, on the putrefaction of ſome of thoſe ſubſtances that are taken in for our nouriſhment. The opinions of the moſt reſpectable authorities countenance theſe modes of operation. The ſaliva and fluids of the mouth conſiſt principally of water, and may therefore be ſuppoſed to poſſeſs an attraction for theſe contagious gaſes. The infection, thus finding its way into the mouth, will almoſt unavoidably get into the ſtomach during the deglutition of our food, or be conveyed there with our drink.

Balfour, in a treatiſe on Putrid Inteſtinal Remitting Fevers, aſcribes the cauſes of theſe complaints to a putrid ſtate of the *mucus lining the inteſtines*, which, being abſorbed by the lacteal veſſels, and carried into the blood, cauſes the febrile ſtate. —“ This mucus receives the infection firſt by contagious matter taken into the ſtomach by means of the ſaliva [*].”

To this may be added the authorities of Turner, Gardiner and Lind; the latter of whom ſays, that ſwallowing the ſpittle, in infected places, is juſtly deemed a means of ſooner acquiring the taint; for which reaſon neither the nurſes, nor any one elſe, ſhould be ſuffered to eat in infected hoſpitals. “I am apt to think, that infection, from whatever impure fountain it is derived, does firſt diſcover itſelf by affecting the ſtomach and inteſtines [†].”

Another mode in which the diſeaſes depending on the ſeptic acid are generated, is by the putrefaction of thoſe ſubſtances taken into the ſtomach, from time to time, for our ſupport. If it be evident that animal and vegetable matter, undergoing diſſolution in the open air, give riſe to the ſeptic acid and its oxyds, is it not preſumable, that this ſame compound will be formed, on the corruption of ſimilar ſubſtances, in the *primæ viæ* of human bodies? It is neceſſary to the maintenance of life, that a proper quantity of food be taken into the ſtomach from time to time; and that the digeſtive organs perform their functions properly; for as the diet is principally of the animal kind, and conſequently containing all the elements neceſſary to the formation of the ſeptic compounds, it would undergo putrefaction in the inteſtinal canal, were it not prevented by the ſaliva, gaſtric liquor, pancreatic juice, and bile, which, mixing with it, diſſolve and prepare it for the various purpoſes it is intended to anſwer. As long then as the ſtomach ſecretes its liquors in healthy and due quantities, will its contents be kept in utter impoſſibility of forming the ſeptic poiſon. But when theſe preventatives are entirely ſuſpended, or weakened, from debilitating cauſes, ſuch as the too liberal uſe of ſpirituous liquors, exceſſive heat, fatigue, or from any other proceſs by which its healthy functions are deſtroyed or impaired, then it is evident that the food will be liable to corrupt, and the products formed from theſe materials, within the ſtomach and inteſtines, ſimilar to thoſe which obtain without the body. A ſource of poiſonous effluvia ſeems thus to exiſt in our bodies; and, from its ſtimulant qualities, the occurrence of nauſea, burning pain, and exceſſive vomiting, together with other ſymptoms of gaſtretis, will not be difficult of explanation. To this cauſe, whether generated in the *primæ viæ*, or taken in from a vitiated atmoſphere, when applied to the inteſtinal canal, are diarrhœas, dyſenteries, and cholera morbus, diſeaſes of the ſame genus, only differently modified, referable. The inflamed ſtate of the ſtomach, duodenum, and lower parts of the inteſtinal canal, and the black gangrenous and mortified ſpots, are all owing to the operation of this acid, which, in ſome caſes, may acquire a higher degree of malignancy than common, by uniting with a larger portion of oxygene. The coffee-coloured matter, commonly called *black vomit*, ejected in what are called *bilious remitting* fevers, ſeems to owe its colour to a mixture of this acid, as appears from its ſtimulant nature, noticed by diſſectors, with a quantity of bile and blood, which is poured out of ſuch veſſels as have their coats deſtroyed by this poiſon. That this is not a diſcharge of putrid bile, is evident from the experiments of Saunders, who obſerved, that ſo far from its becoming putrid, it was leſs liable to undergo this proceſs than any other of the animal fluids, and would even prevent the diſorganization of ſuch ſubſtances as were immerſed in it*. Blood, mixed with bile, became putrid in three days; while no mark of putrefaction manifeſted itſelf in the bile till the ſixth day†. Hence alſo it is evident, that putrid bile, which has been aſſigned as the cauſe of bilious fevers, has no agency in its production; for if the bile did, in reality, become putrid, this change muſt neceſſarily have previouſly taken place in the blood, in which ſtate the animal muſt expire within a few moments after putrefaction takes place.

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[*] Page 130.

[†] On Hot Climates, p. 65.

4. On the application of theſe peſtilential fluids, which have been conſidered the cauſes of the diſeaſes mentioned, to the bodies of men, which it may completely ſurround in ſome caſes, is it preſumed, are the various eruptions and petechiæ, ſo common in fevers of the worſt type, to be explained; and not often to be referred to critical depoſitions of humours from the blood. Theſe affections will put on different appearances and malignancy, in proportion to the concentrated ſtate of the poiſon, the conſtitution, and parts to which it is applied. From the diſpoſition of this acid to adhere to bed-clothes and bedding, of which there are innumerable inſtances, it will readily appear how theſe peſtilential eruptions are produced, eſpecially on thoſe parts that are kept conſtantly covered, as the back, loins, &c. which are thus continually ſurrounded by an atmoſphere of contagious vapours. The ſkin, thus beſet by this fluid, whoſe particles ſeem to inhere in its pores,

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[*] On the Liver, p. 130.

[†] Ibid. p. 110.

becomes inflamed, and puts on this morbid appearance. The yellow colour of the ſkin, in ſome caſes of highly contagious diſeaſes, ſeems to depend upon the ſame cauſe, and not to an abſorption of bile, as has been ſuppoſed by writers on bilious remitting fevers. If theſe changes of colour in the ſkin were really owing to abſorbed or to regurgitated bile, the colour of the urine in theſe caſes ought to be deeply tinged with this fluid, and the fæces to put on an aſh-coloured appearance, as in jaundice; but none of theſe appearances are obſerved to take place in the fevers where this pretended abſorption is alleged. Beſide, it is well known, that ſuch parts of the ſkin to which this poiſon is artificially applied, will put on a yellow appearance, reſembling that which is obſerved to take place in what is called *yellow* fever. It has been obſerved, that perſons ſick with this fever, which had been taken in the Weſt-Indies, had that part of their eyes which was, in viſion, expoſed to atmoſpheric air, tinged with yellow; while the remainder of the eye retained its natural colour. In this caſe the eye could not have acquired this colour from an abſorption of bile; which, if it had been the caſe, would alſo have been evident in other parts of the eye and body. Were it not, probably, for the perpetual ſupply of tears, which waſh the eyes, and thus convey off any contagious fluids that may be applied, theſe appearances might oftener occur, as impreſſions would be quicker obſerved in this organ than on the ſkin.

5. This acid, in a vaporific form, does, no doubt, ſometimes enter the trachea, with the air, in reſpiration, where it may inflame and deſtroy the parts with which it comes in contact; and, in

its paſſage to the lungs, if in a concentrated form, may occaſion ſudden death. In this manner may the ſudden extinction of life, in perſons expoſed to the contagion of the plague. as obſerved by Ruſſel, be accounted for *. If this gaſeous fluid be inſpired in ſuch a diluted ſtate as not to occaſion immediate death, it may cauſe catarrhal affections, anxiety, coma, ſuffocation, &c. depending on the ſparſe or concentrated form, and circumſtances under which it is applied. When mixed with atmoſpheric air, and taken into the lungs, it will not ſerve the purpoſes of reſpiration, as but a ſmall portion of vital air will be decompounded, owing to the large quantity of non-reſpirable air which is taken in. The heat of the body muſt thereby be leſſened, and the contractions of the heart and arteries become more ſlow and feeble. In this way may the purple and blackiſh ſpots of perſons dead of fever, occaſioned by this acid and its oxyd, and the livid and dark colour of the ſkin, attended with coldneſs during life, be accounted for; the lungs not being able to reſtore to the ſyſtem its uſual and neceſſary ſupply of oxygene. Hæmorrhages, debility, and proſtration of ſtrength, together with want of coheſion in the ſolids, might all be explained upon the ſame principle, the muſcles being deprived of their uſual quantity of oxygene, and overcharged with ſepton.

6. If this acid be formed in the ſtomach and inteſtines, or taken in by the ſaliva, and applied to the mouth, fauces, cuticular and pulmonic ſurface, can it be ſuppoſed, that it ſhould not be taken up by the abſorbent veſſels of the ſkin and pulmonic

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* Hiſtory of Aleppo, p. 232.

organs, or abſorbed by the lacteals of the inteſtines, which are known, in ſome inſtances, even to take up ſome of the fæces, and carry it into the maſs of blood? That ſomething of a peſtilential nature is conveyed into the blood, appears from the evident marks of peſtilential infection, which children, born of mothers ſick with the plague, bring along with them. Whether they acquired this taint immediately from the blood circulating through the umbilical cord, or from the *liquor amnii*, or both conjoined, is immaterial to our preſent purpoſe, as, in either manner, it goes to prove what has been ſaid above. The acid ſweats thrown out from the poiſoned maſs of blood, by means of the ſmall exhalent arteries, in malignant and peſtilential diſeaſes, forming the matter of contagion, and adhering to the bed-clothes and linen, which, by its corroſive qualities, it deſtroys and rots; and, if excreted in any conſiderable quantity, ſo commonly relieves the patient; inaſmuch as the volume of poiſon contained in the arterial ſyſtem is thereby leſſened; ſhews that the blood, in certain diſeaſes, contains ſomething of a noxious nature. The appearances alſo which blood, drawn in peſtilential fevers, puts on, correſpond with that in which ſeptic gas had been artificially injected *. Blood, thus infected with this poiſon, taken up by the abſorbent veſſels, will be carried the round of circulation, and will continue to ſtimulate the heart and arteries, wearing out their excitability, and, conſequently, bring on death, if the conſtitution be incapable of becoming habituated to its ſtimulus, or part, or whole, of the ſtimulus be not ſubducted. If it be preſent in any great quantity, it may cauſe a ſudden extinction of the vital principle, as is obſerved ſometimes to happen in highly peſtilential diſeaſes.

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* *Vide* Mitchill on the Effects of Contagion on the Heart, in the New-York Mag. for 1796.

7. The above-mentioned compounds, when abſorbed by the lymphatics, may inflame them, and cauſe obſtructions, indurations, and even ſuppuration, of thoſe glands through which they paſs, as is commonly obſerved to take place in the inguinal and axillary glands, in the plague, and other diſeaſes produced by a peſtilential ſtate of the atmoſphere, where it is abſorbed in a highly concentrated form. Inſtances have occurred, where the lymphatics of the hand, on this extremity being wounded, in diſſecting bodies, in which the ſeptic acid appears already to be formed, were highly inflamed, and could be readily traced from the part where this fluid had been applied, in their courſe to the glands in the axilla, in which ſubſequent ſuppuration took place. Beſide the affections of theſe glands, thoſe of the meſentery will be liable to like maladies; and more frequently, as this deleterious fluid will be more frequently applied to them, by reaſon of its abſorption from the inteſtines. The ſeptic compounds, paſſing through the lacteals, will inflame them, and extend to the glands, in their way to the thoracic duct, and bring on an indurated or ſchirrous ſtate: if it be abſorbed in a highly concentrated ſtate, it may alſo communicate its effects to the meſentery. When theſe glands become indurated or inflamed, the chyle will neceſſarily be obſtructed totally, or in part, in its circulation through theſe glands; conſequently the ſyſtem will not receive a ſupply of nouriſhment equal to the quantity expended in performing its healthy functions. Hence the body muſt waſte away, and the

diſeaſe named maraſmus be induced. The frequent dropſical affections which follow long-continued intermittents, dyſenteries, and other diſeaſes of the ſame claſs, appear, in many inſtances, to be owing to obſtructions of theſe glands, which do not allow a free paſſage to the lymph, which is therefore depoſited in the different cavities and cellular texture of the body; and in proportion as the obſtruction is more or leſs univerſal, will the diſeaſe be general or local.

Application of this Principle to explain the Prevention and Deſtruction of Infection, or Contagion, in Ships performing Quarantine, in Jails, Hoſpitals, private Dwellings, in regulating the Police of Cities, in the Management of Lazarettos, &c.

HAVING ſhewn the operation of the ſeptic acid, on its application to the conſtitution, we come next to conſider its prevention and deſtruction in ſhips performing quarantine, &c. &c.

1. In ſuch ſhips as have theſe noxious effluvia floating about, either derived from articles infected, or generated from the collection and putrefaction of ſuch materials as contain ſepton, it will be proper, from the known affinity which ſubſiſts between theſe contagious vapours and calcareous earth (lime), to expoſe this ſubſtance to an atmoſphere thus impregnated. White-waſhing between decks, and all ſuch places as may admit of this practice, will therefore be the moſt advantageous method in which it can be applied, as a larger ſurface will

thereby

thereby be expoſed, and, conſequently, a greater portion of the acid taken up and neutralized in a given time. Frequent repetitions of this practice will be neceſſary where the contagion is abundant, as the lime will become ſaturated with this principle, and incapable to attract and take out of circulation any more of the noxious compound. In ſuch inſtances where theſe effluvia have, for any length of time, been preſent in veſſels, it is more than probable, that from the capability exiſting between the two to unite, the timber of the latter may imbibe ſome of theſe vapours; and to this, as has been above remarked, may it be owing, that the ſucceſſive crews of certain veſſels are ſometimes deſtroyed. To deſtroy this connection between theſe two bodies, as well as to prevent the future aſcent of the gas, and thus again taint the circumambient atmoſphere, a ſolution of the vegetable alkali (pot-aſh) in water, which poſſeſſes the greateſt known affinity for this fluid, will be a proper preventive. It will diſengage the acid from its connection with the wood, in conſequence of this ſuperior attraction, and join with it itſelf. Frequent waſhing the apartments will likewiſe tend greatly to cleanſe and carry off the noxious vapours; and will alſo, by being imbibed into the texture of the wood, ſet looſe and convey away ſuch poiſon as may remain. Ventilation muſt not be neglected: the contaminated atmoſphere will thereby have part of its volume conveyed off, and a quantity of purer air admitted; thus rendering its ſtimulating quality leſs violent and active.

2. The ſame means recommended above for the deſtruction of theſe fluids in ſhips will apply to jails.—As white-waſhing the walls with lime can at all times and readily be done here, it ought, from

time to time, to be renewed; the poiſonous effluvia being thus conſtantly taken up, and rendered harmleſs. Waſhing the apartments with water or ley, which has a ſtill greater affinity for theſe effluvia, will diſengage the poiſon with which they ſo commonly become impregnated, to the injury of the health of the inhabitants of theſe places. In no one inſtance will it be more neceſſary to admit freſh air, than in theſe places. The pent-up vapours will, in a ſhort time, acquire a high degree of malignancy, and cauſe difficulty of reſpiration, uneaſineſs about the precordia, and bring on other ſymptoms indicative of a vitiated ſtate of the atmoſphere.

3. The regulation of hoſpitals will be anſwered by the ſame means already noticed for jails and ſhips: but, from the ſpecific gravity of this acid or its oxyd, it will occupy the lowermoſt parts of the rooms. "Under an atmoſpheric preſſure which ſupports the quickſilver in the barometer at 29. 84 inches, and in a temperature of 54. 5 of Fahrenheit, a cubic foot of azotic gas weighed one ounce, thirty grains and one half; and of oxygenous gas, one ounce, one drachm, and fifty-one grains: it is preſumable that a combination of the two, that is, thirty-ſeven parts of oxygene united to thirty-three of azote, would form a fluid of nearly the ſame weight with atmoſpheric air, or rather heavier; and the probability of this would increaſe, by conſidering that a cubic foot of nitrous gas, which contains only thirty-one parts more of oxygene than the gaſeous oxyd does, weighs one ounce, two drachms, and thirty-nine grains." Hence, then, perſons who lay on or near the floor, where this compound is preſent, will ſuffer more than thoſe who walk through theſe places; and for this reaſon alſo will the atmoſphere on the ſecond floor be

more reſpirable than that on the firſt, or loweſt. Vent-holes, upon a level with the lowermoſt part of the room, may therefore more readily ſuffer the eſcape of theſe noxious compounds; and, in addition with thoſe ſubſtances that take up and neutralize them quickly, reſtore the purity and reſpirability of the air.

4. The preventives already mentioned, particularly for ſhips, which may be conſidered as floating habitations of men, will alſo apply to the cleanſing and purification of private dwellings. From what has been ſaid on the affinity of lime with the ſeptic acid, it will at firſt view appear how much more preferable and conducive to the health of the inhabitants ſuch dwellings, which have their walls plaiſtered with this ſubſtance, will be, to thoſe of gypſum (ſulphate of lime), which is incapable to neutralize the acid. The common practice to prevent and deſtroy contagion in private dwellings, by means of alkalies diſſolved in water, ſuch as ley, &c. and lime, ſhews how much preferable this management and contrivance is to that of burning tar, coal, ſulphur, &c. ſubſtances that poſſeſs no uſeful, but pernicious qualities, inaſmuch as the peſtilential matter reſiſts the attractive powers of theſe ſubſtances.

5. In regulating the police of cities, it will at firſt view appear highly neceſſary, in order to prevent the formation of theſe noxious fluids, to remove all the materials, ſuch as animal and certain vegetable ſubſtances, from which they are generated. In addition to the preventives enumerated for the prevention and deſtruction of contagion in jails, &c. planting trees along the ſtreets, eſpecially thoſe which are, from ſituation, more liable to collections of gaſes of this kind, will be of ſervice in decom-

pounding theſe fluids, as ſoon as formed, if in conſiderable quantities, and thus reſtore the air to its former ſtate of reſpirability. "Theſe very ſubſtances (putrefying bodies and ſtreet-manure), that cauſe ſo much miſchief and terror in *cities*, are ſought after with great avidity by farmers, who purchaſe them at a high price, and uſe them, with much advantage, to fertilize their fields. The beneficial and ſalutary effects of this practice in huſbandry, makes it look as if nitrous acid and nitrous airs were good manures, and that vegetables had the power of decompounding them; that, in ſhort, in the economy of plants, there is a proceſs by which the ſepton and oxygene of theſe infectious fluids are ſeparated; and while the former remains in the vegetable as a part of its nutriment, the ſurpluſage of the latter, after forming gum, mucus, meal, &c. and other vegetable oxyds, flies off through the upper ſurface of the leaves, in company with heat and light, in the form of vital air." (Vide Mitchill on the decompoſition of contagious air by vegetation. New-York Mag. for 1797.)

The luxuriant growth of vegetables in the ſummer and autumn of 1795, in New-York, during the epidemic, makes it further evident, that vegetables decompound this noxious body, and thus act in a beneficial and ſalutary manner. Upon this principle in vegetables to deſtroy the chemical union between the ingredients of ſeptous airs, may the dangerous conſequences often attending the cutting down of woods in new and uncultivated countries, be accounted for. The exhalations from the ſwamps, moraſſes, &c. being ſet looſe in greater quantity in the atmoſphere, by the now more direct rays of the ſun, without any adequate ſupply of other vegetable ſubſtance to arreſt and decompound them, they aſcend, and pervade the air, carrying on their uſual noxious and deleterious qualities, on meeting the bodies of men or brute creation.

6. The management of lazarettos may be conducted upon the ſame principle. From the known miſcibility of contagion with water, and the ſhort diſtance theſe fluids extend their influence over this body, as has been repeatedly obſerved by Lind, and others, the moſt proper and healthy ſituations for inſtitutions of this kind are readily pointed out. And,

7. According to what has been ſaid in the fifth chapter, concerning the production of contagious fluids in the ſtomach and inteſtinal tube, from animal and certain vegetable food, taken in from time to time, it will appear, that ſuch ſubſtances as contain ſepton to any amount, ſuch as lean and muſcular animal ſubſtances, are improper ingredients in diet. Such articles then as contain none of this principle, ought to be ſelected as the moſt proper for nouriſhment in complaints occaſioned by this acid. Fat or oily ſubſtances being of this claſs, and vegetables containing but little ſepton, ought to be the moſt beneficial and wholeſome diet in malignant and peſtilential diſeaſes. This is authenticated by facts ſufficiently numerous to put it beyond cavil.

The comparative health, in the Weſt Indies, between the Engliſh, who indulge in the free uſe of animal food, and the French who, on the contrary, abſtain from this kind of aliment, and live principally on vegetable food, ſhews that animal matter is not only improper, but is an injurious article in our diet, in all peſtilential conditions of the atmoſphere, or when malignant diſeaſes prevail. The ſame is obſerved to happen in Bengal, and other parts of the Eaſt Indies. The Engliſh, who live principally on animal and vegetable food, are far more liable to attacks of malignant diſeaſes, and a greater number of them are carried off annually thereby, than of the Gentoos and Brahmans, who live on rice. Beſide, it is well known how much leſs fatal the *yellow fever*, and other ſpecies of malignant diſeaſes, are among the Negroes of the Weſt Indies, and thoſe of the Southern ſtates, who live on vegetable food for the moſt part, than among the Whites of theſe places, who are under no neceſſity of abſtaining from the uſe of animal food.

POSTSCRIPT.

March 8th, 1799.

WE have juſt ſeen Dr. I. C. Smyth's new edition, with freſh reports from ſeveral navy ſurgeons, tranſmitted to the Doctor by the Commiſſioners of Sick and Wounded. We have no doubt but the Commiſſioners will be zealous to furniſh the Doctor with evidence if it come within their power, for their opinion of fumigation is embarked with his. We have looked in vain for clear facts in this new arrangement, and we are ſorry to ſee time and talents like thoſe of Dr. Smyth ſo miſapplied, in ſcrutinizing a ſubject where his own practice has availed him ſo little. Ten days at Wincheſter priſon was a ſhort ſpace for a complete knowledge of infection and typhus-fever. We alſo think the practice in high life, where the Doctor's patients chiefly lie, can have afforded him but narrow experience. Contagion there produces other diſeaſes. It is humble drudges in the profeſſion, like myſelf, that muſt earn knowledge among ſhip-fevers.

The Doctor finiſhes as he began: he ſet out without any fixed principle to direct him, and he ends by giving negative facts inſtead of poſitive

ſitive ones. We are glad to ſee his correſpondents ſtill recommending cleanlineſs and ventilation; they are the only ſecurities againſt the poiſonous nitrous vapour.

We wiſh to reſcue Mr. Moffat's name from the favourers of this *quackery:* under the article "Malignant Ulcer," Mr. Moffat, in a ſubſequent report, withdraws his former teſtimony.

This publication will probably be the laſt, that will venture to diſſeminate the uſe of lethalic vapours in the apartments of ſick perſons. Fumigation has had a long reign in the practice of phyſic: it hath ſlain its thouſands and its ten thouſands. The late efforts which have been made to prove it the legitimate offspring of experimental philoſophy, have accelerated its deſtruction. There is a riſing generation of ſurgeons in the Britiſh navy, who are capable of wielding the principles of ſcience; and they will never again ſuffer it to walk the earth. *Peace to its manes!*

SINCE this volume was put to the preſs, the foreign journals have announced a tranſlation of the "Medicina Nautica" into the German language, by Dr. C. Warner, at Jena in Saxony; and accompanied with a learned preface by the celebrated Profeſſor Hufeland, of that univerſity.

Before the publication of our next volume, we hope to be able to obtain an Engliſh tranſlation of that preface, to ſatisfy the curioſity of the contributors to this undertaking with reſpect to the value ſet upon our inquiries by theſe illuſtrious foreigners.

This intelligence we truſt will be a freſh ſtimulus to the exertions of our friends; as it muſt be now proved to the world, that in deſpite of local prejudices, the ſervice of the country has proſpered in our hands, while theſe ſtudies have contributed a large ſhare of new facts to a ſcience that has in view the relief of human miſery. With ſuch incitements, our labours cannot relax. The life of a profeſſional man, thus divided between the active duties of ſtation and a ſtudious retirement, poſſeſſes an aſylum and enjoyments which no external circumſtances can aſſail;

> What nothing earthly gives, or can deſtroy,
> The ſoul's calm ſunſhine, and the heartfelt joy.
>
> POPE.

END OF THE SECOND VOLUME.